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City of San Diego, sole P: (858) 592-6500 F: (858) 592-1410 d Successor Agency
to the Redevelopment Agency of the City of San Diego, a former public
body, corporate and politic, herein referred to as

Successor Agency

CONTRACTOR'S NAME: _____
ADDRESS: _____
TELEPHONE NO.: _____ FAX NO.: _____
CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633
G. Sorenson / J. Borja / LJI

CONTRACT DOCUMENTS

FOR

ORIGINAL



Fire Station No. 2 (Bayside)

VOLUME 1 OF 2

BID NO.: _____ **K-16-6523-DBB-3**
SAP NO. (WBS/IO/CC): _____ **23432314**
CLIENT DEPARTMENT: _____ **2116 / 1611 / 1912 / 2112**
COUNCIL DISTRICT: _____ **3**
PROJECT TYPE: _____ **BC / IL**

THIS CONTRACT IS SUBJECT TO THE FOLLOWING:


- THE CITY'S SUBCONTRACTING PARTICIPATION REQUIREMENTS FOR SLBE PROGRAM.
- PREVAILING WAGE RATES: STATE FEDERAL
- APPRENTICESHIP

BID DUE DATE:

**2:00 PM
OCTOBER 13, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101**

ENGINEER OF WORK

The technical content of the engineering Specifications and Special Provisions contained herein has been prepared by or under the direction of the following Professional Engineer and Architect:


1) Registered Architect, Rob Wellington Quigley


9/8/15
Date

Seal:



ORIGINAL

The contractual content of the engineering Specifications and Special Provisions contained herein has been reviewed by the following Professional Engineer:


2) Registered Project Engineer, Gertrud Sorenson

9/8/15
Date

Seal:



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The Successor Agency is defined in SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS of Volume 1 of this solicitation. **All references herein to City shall be deemed to refer to the Successor Agency where necessary to identify the agency in privity of contract for the performance of this project.**

CITY OF SAN DIEGO, CALIFORNIA

NOTICE INVITING BIDS

1. **RECEIPT AND OPENING OF BIDS:** Bids will be received at the Public Works Contracts at the location, time, and date shown on the cover of these specifications for performing work on **Fire Station No. 2 (Bayside)** (Project).
2. **SUMMARY OF WORK:** The Work involves furnishing all labor, materials, equipment, services, and other incidental works and appurtenances for the construction of the Project as described in ATTACHMENT A.
3. **BIDS ARE PUBLIC RECORDS:** Upon receipt by the City, Bids shall become public records subject to public disclosure. It is the responsibility of the respondent to clearly identify any confidential, proprietary, trade secret or otherwise legally privileged information contained within the Bid. General references to sections of the California Public Records Act (PRA) will not suffice. If the Contractor does not provide applicable case law that clearly establishes that the requested information is exempt from the disclosure requirements of the PRA, the City shall be free to release the information when required in accordance with the PRA, pursuant to any other applicable law, or by order of any court or government agency, and the Contractor will hold the City harmless for release of this information.
4. **SUBCONTRACTING PARTICIPATION PERCENTAGES:**
 - 4.1. The City has incorporated **mandatory** SLBE-ELBE subcontractor participation percentages to enhance competition and maximize subcontracting opportunities. For the purpose of achieving the mandatory subcontractor participation percentages, a recommended breakdown of the SLBE and ELBE subcontractor participation percentages based upon certified SLBE and ELBE firms has also been provided to achieve the mandatory subcontractor participation percentages:

1. SLBE participation	3.6%
2. ELBE participation	9.7%
3. Total mandatory participation	13.3%
 - 4.2. The Bidders are **required** to attend the Pre-Bid Meeting to better understand the Good Faith Effort requirements of this contract. See the City's document titled "SLBE Program, Instructions For Bidders Completing The Good Faith Effort Submittal" available at: <http://www.sandiego.gov/eoc/>
 - 4.3. The Bid will be declared non-responsive if the Bidder fails the following mandatory conditions:
 - 4.3.1. Attending the Pre-Bid Meeting.
 - 4.3.2. Bidder's inclusion of SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; OR.

4.3.3. Bidder's submission of Good Faith Effort documentation, saved in searchable Portable Document Format (PDF) and stored on Compact Disc (CD) or Digital Video Disc (DVD), demonstrating the Bidder made a good faith effort to outreach to and include SLBE-ELBE Subcontractors required in this document within **3 Working Days** of the Bid opening if the overall mandatory participation percentage is not met.

4.4. For additional Equal Opportunity Contracting Program requirements, see Attachment C.

5. **PRE-BID MEETING:**

5.1. There will be a Pre-Bid Meeting to discuss the scope of the Project, bidding requirements, pre-qualification process, and Equal Opportunity Contracting Program requirements and reporting procedures in the Public Works Contracts, Conference Room at 1010 Second Avenue, 14th Floor, San Diego, CA 92101 **at 10:00 A.M., on September 22, 2015.**

5.2. **The Pre-Bid Meeting has been designated as MANDATORY. All potential bidders are required to attend.** Bid will be declared **non-responsive** if the Bidder fails to attend the Pre-Bid Meeting when specified to be mandatory. Attendance at the Pre-Bid Meeting will be evidenced by the representative's signature on the attendance roster. It shall be the responsibility of the Bidder's representative to complete and sign the attendance roster. **No Bidder will be admitted after the specified start time of the mandatory Pre-Bid Meeting.**

5.3. To request a copy of the agenda on an alternative format, or to request a sign language or oral interpreter for this meeting, call the Public Works Contracts at (619) 533-3450 at least 5 Working Days prior to the Pre-Bid Meeting to ensure availability.

6. **CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM:**

6.1. **Prior** to the Award of the Contract or each Task Order, you and your Subcontractors and Suppliers must register with the City's web-based vendor registration and bid management system, BidsOnline™ hosted by PlanetBids System. For additional information go to:

<http://www.sandiego.gov/purchasing/bids-contracts/vendorreg.shtml>.

6.2. The Successor Agency may not award the contract until registration of all subcontractors and suppliers is complete. In the event this requirement is not met within the time frame specified in the Notice of Intent to Award letter, the Successor Agency reserves the right to rescind the Notice of Award / Intent to Award and to make the award to the next responsive and responsible bidder / proposer.

7. **PRE-BID SITE VISIT:** The prospective Bidders are encouraged to visit the Work Site with the Engineer. The purpose of the Site visit is to acquaint Bidders with the Site conditions. To request a sign language or oral interpreter for this visit, call the Public Works Contracts at (619) 533-3450 at least 5 Working Days prior to the meeting to ensure availability. A Pre-Bid Site Visit is offered when the details are provided as follows:

Time: 11:00 A.M.
Date: September 22, 2015
Location: 875 West Cedar Street, San Diego, CA 92101

8. **JOINT VENTURE CONTRACTORS:** Provide a copy of the Joint Venture agreement and the Joint Venture license to the City within 10 Working Days after receiving the Contract forms. See 2-1.1.2, "Joint Venture Contractors" in The WHITEBOOK for details.
9. **PREVAILING WAGE RATES:** Pursuant to San Diego Municipal Code section 22.3019, construction, alteration, demolition, repair and maintenance work performed under this Contract is subject to State prevailing wage laws. For construction work performed under this Contract cumulatively exceeding \$25,000 and for alteration, demolition, repair and maintenance work performed under this Contract cumulatively exceeding \$15,000, the Contractor and its subcontractors shall comply with State prevailing wage laws including, but not limited to, the requirements listed below.
 - 9.1. **Compliance with Prevailing Wage Requirements.** Pursuant to sections 1720 through 1861 of the California Labor Code, the Contractor and its subcontractors shall ensure that all workers who perform work under this Contract are paid not less than the prevailing rate of per diem wages as determined by the Director of the California Department of Industrial Relations (DIR). This includes work performed during the design and preconstruction phases of construction including, but not limited to, inspection and land surveying work.
 - 9.1.1. Copies of such prevailing rate of per diem wages are on file at the City and are available for inspection to any interested party on request. Copies of the prevailing rate of per diem wages also may be found at <http://www.dir.ca.gov/OPRL/DPreWageDetermination.htm>. Contractor and its subcontractors shall post a copy of the prevailing rate of per diem wages determination at each job site and shall make them available to any interested party upon request.
 - 9.1.2. The wage rates determined by the DIR refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, then the published rate of wage shall be in effect for the life of this Contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the DIR, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this Contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this Contract, each successive predetermined wage rate shall apply to this Contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of this Contract, such wage rate shall apply to the balance of the Contract.

- 9.2. Penalties for Violations.** Contractor and its subcontractors shall comply with California Labor Code section 1775 in the event a worker is paid less than the prevailing wage rate for the work or craft in which the worker is employed.
- 9.3. Payroll Records.** Contractor and its subcontractors shall comply with California Labor Code section 1776, which generally requires keeping accurate payroll records, verifying and certifying payroll records, and making them available for inspection. Contractor shall require its subcontractors to also comply with section 1776. Contractor and its subcontractors shall submit weekly certified payroll records online via the City's web-based Labor Compliance Program. Contractor is responsible for ensuring its subcontractors submit certified payroll records to the City.
- 9.3.1.** For contracts entered into on or after April 1, 2015, Contractor and their subcontractors shall furnish records specified in Labor Code section 1776 directly to the Labor Commissioner in the manner required by Labor Code section 1771.4.
- 9.4. Apprentices.** Contractor and its subcontractors shall comply with California Labor Code sections 1777.5, 1777.6 and 1777.7 concerning the employment and wages of apprentices. Contractor is held responsible for the compliance of their subcontractors with sections 1777.5, 1777.6 and 1777.7.
- 9.5. Working Hours.** Contractor and their subcontractors shall comply with California Labor Code sections 1810 through 1815, including but not limited to: (i) restrict working hours on public works contracts to eight hours a day and forty hours a week, unless all hours worked in excess of 8 hours per day are compensated at not less than 1½ times the basic rate of pay; and (ii) specify penalties to be imposed on design professionals and subcontractors of \$25 per worker per day for each day the worker works more than 8 hours per day and 40 hours per week in violation of California Labor Code sections 1810 through 1815.
- 9.6. Required Provisions for Subcontracts.** Contractor shall include at a minimum a copy of the following provisions in any contract they enter into with a subcontractor: California Labor Code sections 1771, 1771.1, 1775, 1776, 1777.5, 1810, 1813, 1815, 1860 and 1861.
- 9.7. Labor Code Section 1861 Certification.** Contractor in accordance with California Labor Code section 3700 is required to secure the payment of compensation of its employees and by signing this Contract, Contractor certifies that "I am aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract."
- 9.8. Labor Compliance Program.** The City has its own Labor Compliance Program authorized in August 2011 by the DIR. The City will withhold contract payments when payroll records are delinquent or deemed inadequate by the City or other governmental entity, or it has been established after an investigation by the City or other governmental entity that underpayment(s) have occurred. For questions or assistance, please contact the City of San Diego's Equal Opportunity Contracting Department at 619-236-6000.

9.9. Contractor and Subcontractor Registration Requirements. This project is subject to compliance monitoring and enforcement by the DIR. As of March 1, 2015, no contractor or subcontractor may be listed on a bid or proposal for a public works project unless registered with the DIR pursuant to Labor Code section 1725.5. As of April 1, 2015, a contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, or enter into any contract for public work, unless currently registered and qualified to perform public work pursuant to Labor Code section 1725.5. By submitting a bid or proposal to the City, Contractor is certifying that he or she has verified that all subcontractors used on this public work project are registered with the DIR in compliance with Labor Code sections 1771.1 and 1725.5, and Contractor shall provide proof of registration to the City upon request.

9.9.1. A Contractor's inadvertent error in listing a subcontractor who is not registered pursuant to Labor Code section 1725.5 in response to a solicitation shall not be grounds for filing a bid protest or grounds for considering the bid non-responsive provided that any of the following apply: (1) the subcontractor is registered prior to bid opening; (2) within twenty-four hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in Labor Code section 1725.5; or (3) the subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

10. INSURANCE REQUIREMENTS:

10.1. All certificates of insurance and endorsements required by the contract are to be provided upon issuance of the Successor Agency's Notice of Intent to Award letter.

10.2. Refer to sections 7-3, "LIABILITY INSURANCE", and 7-4, "WORKERS' COMPENSATION INSURANCE" of the Supplementary Special Provisions (SSP) for the insurance requirements which must be met.

11. PREQUALIFICATION OF CONTRACTORS:

11.1. Contractors submitting Bid must be pre-qualified for the total amount proposed, inclusive of all alternate items prior to the date of submittal. Bids from contractors who have not been pre-qualified as applicable and Bids that exceed the maximum dollar amount at which contractors are pre-qualified will be deemed **non-responsive** and ineligible for award. Complete information and links to the online prequalification application are available at:

<http://www.sandiego.gov/cip/bidopps/prequalification.shtml>

11.2. The completed application must be submitted online to the Public Works Contracts, Prequalification Program no later than 2 weeks prior to the bid opening. For additional information or the answer to questions about the prequalification program, contact David Stucky at 619-533-3474 or dstucky@sandiego.gov.

11.3. As a result of the City's fiduciary requirement to safeguard vendor data, City staff will not be able to provide information regarding contractors' prequalification status over the telephone. Contractors may access real-time information about their prequalification status via their vendor profile on [PlanetBids™](#).

12. **REFERENCE STANDARDS:** Except as otherwise noted or specified, the Work shall be completed in accordance with the following standards:

Title	Edition	Document Number
Standard Specifications for Public Works Construction ("The GREENBOOK")	2012	PITS070112-01
City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK")*	2012	PITS070112-02
City of San Diego Standard Drawings*	2012	PITS070112-03
Caltrans Standard Specifications	2010	PITS070112-04
Caltrans Standard Plans	2010	PITS070112-05
California MUTCD	2012	PITS070112-06
City Standard Drawings - Updates Approved For Use (when specified)*	Varies	Varies
Standard Federal Equal Employment Opportunity Construction Contract Specifications and the Equal Opportunity Clause Dated 09-11-84	1984	769023
Centre City Streetscape Manual	2012 Revised Draft	
NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml		

13. **CITY'S RESPONSES AND ADDENDA:** The City at its option, may respond to any or all questions submitted in writing, via letter, or FAX in the form of an addendum. No oral comment shall be of any force or effect with respect to this solicitation. The changes to the Contract Documents through addendum are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda on the form provided for this purpose in the Bid.
14. **CITY'S RIGHTS RESERVED:** The City reserves the right to cancel the Notice Inviting Bids at any time, and further reserves the right to reject submitted Bids, without giving any reason for such action, at its sole discretion and without liability. Costs incurred by the Bidder(s) as a result of preparing Bids under the Notice Inviting Bids shall be the sole responsibility of each bidder. The Notice Inviting Bids creates or imposes no obligation upon the City to enter a contract.
15. **CONTRACT PRICING FORMAT:** This solicitation is for a Lump Sum contract with Unit Price provisions as set forth in the Bid Proposal Form(s), Volume 2.
16. **SUBMITTAL OF "OR EQUAL" ITEMS:** See Section 4-1.6, "Trade Names or Equals" in The WHITEBOOK and as amended in the SSP.

17. AWARD PROCESS:

- 17.1. The Award of this contract is contingent upon the Contractor's compliance with all conditions precedent to Award.
- 17.2. Upon acceptance of a Bid, the Successor Agency will prepare contract documents for execution within approximately 21 days of the date of the Bid opening and award the Contract approximately within 7 days of receipt of properly executed Contract, bonds, and insurance documents.
- 17.3. This contract will be deemed executed, and effective, only upon the signing of the Contract by the Mayor or designee of the Successor Agency.

18. SUBCONTRACT LIMITATIONS: The Bidder's attention is directed to Standard Specifications for Public Works Construction, Section 2-3, "SUBCONTRACTS" in The GREENBOOK and as amended in the SSP which requires the Contractor to self-perform not less than the specified amount. Failure to comply with this requirement shall render the bid **non-responsive** and ineligible for award.

19. AVAILABILITY OF PLANS AND SPECIFICATIONS: Contract Documents may be obtained by visiting the City's website: <http://www.sandiego.gov/cip/>. Plans and Specifications for this contract are also available for review in the office of the City Clerk or Public Works Contracts.

20. SUBMISSION OF QUESTIONS:

20.1. The Director (or designee), of the Public Works Department is the officer responsible for opening, examining, and evaluating the competitive Bids submitted to the City for the acquisition, construction and completion of any public improvement except when otherwise set forth in these documents. All questions related to this solicitation shall be submitted to:

Public Works Contracts
1010 Second Avenue, 14th Floor
San Diego, California, 92101
Attention: [Contract Specialist listed on the front cover hereof]

OR:

Email address of the Contract Specialist listed on the front cover hereof.

- 20.2. Questions received less than 14 days prior to the date for opening of Bids may not be considered.
- 20.3. Clarifications deemed by the City to be material shall be issued by Addenda and uploaded to the City's online bidding service.
- 20.4. Only questions answered by formal written addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. It is the Bidder's responsibility to become informed of any Addenda that have been issued and to include all such information in its Bid.

21. **ELIGIBLE BIDDERS:** No person, firm, or corporation shall be allowed to make, file, or be interested in more than one (1) Bid for the same work unless alternate Bids are called for. A person, firm or corporation who has submitted a sub-proposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a sub-proposal or quoting prices to other Bidders or from submitting a Bid in its own behalf. Any Bidder who submits more than one bid will result in the rejection of all bids submitted.
22. **SAN DIEGO BUSINESS TAX CERTIFICATE:** The Contractor and Subcontractors, not already having a City of San Diego Business Tax Certificate for the work contemplated shall secure the appropriate certificate from the City Treasurer, Civic Center Plaza, first floor and submit to the Contract Specialist upon request or as specified in the Contract Documents. Tax Identification numbers for both the Bidder and the listed Subcontractors must be submitted on the City provided forms with the Notice Inviting Bids and Contract forms.
23. **PROPOSAL FORMS:** Bid shall be made only upon the Bidding Documents i.e., Proposal form attached to and forming a part of the specifications. The signature of each person signing shall be in longhand.
- 23.1. Bidder shall complete and submit all pages in the "Bidding Document" Section (see Volume 2) as their Bid per the schedule given under "Required Documents Schedule," (see Volume 1). Bidder is requested to retain for their reference other portions of the Contract Documents that are not required to be submitted with the Bid. The entire specifications for the bid package do not need to be submitted with the bid.
- 23.2. The City may require any Bidder to furnish a statement of experience, financial responsibility, technical ability, equipment, and references.
- 23.3. Bids and certain other forms and documents as specified in the Volume 2 of 2 of the Contract Documents shall be enclosed in a sealed envelope and shall bear the title of the work and name of the Bidder and the appropriate State Contractors License designation which the Bidder holds.
- 23.4. Bids may be withdrawn by the Bidder prior to, but not after, the time fixed for opening of Bids.
24. **BIDDER'S GUARANTEE OF GOOD FAITH (BID SECURITY):**
- 24.1. Bidders shall submit Bid Security at bid time. Bid Security shall be in one of the following forms: a cashier's check, or a properly certified check upon some responsible bank; or an approved corporate surety bond payable to the Successor Agency of the City of San Diego for an amount of not less than 10% of the total bid amount.
- 24.2. This check or bond, and the monies represented thereby, will be held by the Successor Agency as a guarantee that the Bidder, if awarded the contract, will in good faith enter into the contract and furnish the required final performance and payment bonds.
- 24.3. The Bidder agrees that in the event of the Bidder's failure to execute this contract and provide the required final bonds, the money represented by the cashier's or certified check will remain the property of the Successor Agency; and the Surety agrees that it

will pay to the Successor Agency the damages, not exceeding the sum of 10% of the amount of the Bid, that the Successor Agency may suffer as a result of such failure.

24.4. A Bid received without the specified bid security may be rejected as **non-responsive**.

25. AWARD OF CONTRACT OR REJECTION OF BIDS:

25.1. This contract may be awarded to the lowest responsible and reliable Bidder.

25.2. Bidders shall complete the entire Bid schedule (also referred to as “schedule of prices” or Proposal form). Incomplete price schedules will be rejected as being non-responsive.

25.3. The City reserves the right to reject any or all Bids, and to waive any informality or technicality in Bids received and any requirements of these specifications as to bidding procedure.

25.4. Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City from the Bidder within 3 Working Days, excluding Saturdays, Sundays, and state holidays, after the opening of Bids, of written notice which includes proof of honest, credible, clerical error of material nature, free from fraud or fraudulent intent, and of evidence that reasonable care was observed in the preparation of the Bid.

25.5. A bidder who is not selected for contract award may protest the award of a contract to another bidder by submitting a written protest in accordance with section 22.3017 of the San Diego Municipal Code

25.6. The City of San Diego or Successor Agency will not discriminate with regard to race, religious creed, color, national origin, ancestry, physical handicap, marital status, sex or age, in the award of contracts.

25.7. Each Bid package properly executed as required by these specifications shall constitute a firm offer, which may be accepted by the City within the time specified in the Proposal.

25.8. The City reserves the right to evaluate all Bids and determine the lowest Bidder on the basis of any proposed alternates, additive items or options, at its discretion that will be disclosed in the Volume 2 of 2.

26. BID RESULTS:

26.1. The Bid opening by the City shall constitute the public announcement of the Apparent Low Bidder. In the event that the Apparent Low Bidder is subsequently deemed non-responsive or non-responsible, a public announcement will be posted in the City’s web page <http://www.sandiego.gov/cip/index.shtml>, with the name of the newly designated Apparent Low Bidder.

26.2. To obtain Bid results, either attend Bid opening, review the results on the City’s web site, or provide a self-addressed, stamped envelope, referencing Bid number, and Bid

tabulation will be mailed to you upon verification of extensions. Bid results cannot be given over the telephone.

27. THE CONTRACT:

- 27.1. The Bidder to whom award is made shall execute a written contract with the Successor Agency of San Diego and furnish good and approved bonds and insurance certificates specified by the City within 14 days after receipt by Bidder of a form of contract for execution unless an extension of time is granted to the Bidder in writing.
- 27.2. If the Bidder takes longer than 14 days to fulfill these requirements, then the additional time taken shall be added to the Bid guarantee. The Contract shall be made in the form adopted by the Successor Agency or Civic San Diego, which includes the provision that no claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the City for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.
- 27.3. If the Bidder to whom the award is made fails to enter into the contract as herein provided, the award may be annulled and the Bidder's Guarantee of Good Faith will be subject to forfeiture. An award may be made to the next lowest responsible and reliable Bidder who shall fulfill every stipulation embraced herein as if it were the party to whom the first award was made.
- 27.4. Pursuant to the San Diego City Charter section 94, the Successor Agency may only award a public works contract to the lowest responsible and reliable Bidder. The City will require the Apparent Low Bidder to (i) submit information to determine the Bidder's responsibility and reliability, (ii) execute the Contract in form provided by the City, and (iii) furnish good and approved bonds and insurance certificates specified by the City within 14 Days, unless otherwise approved by the City, in writing after the Bidder receives notification from the City, designating the Bidder as the Apparent Low Bidder and formally requesting the above mentioned items.
- 27.5. The award of the Contract is contingent upon the satisfactory completion of the above mentioned items and becomes effective upon the signing of the Contract by the Successor Agency or designee. If the Apparent Low Bidder does not execute the Contract or submit required documents and information, the Successor Agency may award the Contract to the next lowest responsible and reliable Bidder who shall fulfill every condition precedent to award. A corporation designated as the Apparent Low Bidder shall furnish evidence of its corporate existence and evidence that the officer signing the Contract and bond for the corporation is duly authorized to do so.

- 28. EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE OF WORK:** The Bidder shall examine carefully the Project Site, the Plans and Specifications, other materials as described in the Special Provisions, Section 2-7, and the proposal forms (e.g., Bidding Documents). The submission of a Bid shall be conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and scope of Work, the quantities of materials to be furnished, and as to the requirements of the Bidding Documents Proposal, Plans, and Specifications.

- 29. CITY STANDARD PROVISIONS:** This contract is subject to the following standard provisions. See The WHITEBOOK for details.
- 29.1.** The City of San Diego Resolution No. R-277952 adopted on May 20, 1991 for a Drug-Free Workplace.
 - 29.2.** The City of San Diego Resolution No. R-282153 adopted on June 14, 1993 related to the Americans with Disabilities Act.
 - 29.3.** The City of San Diego Municipal Code §22.3004 for Pledge of Compliance.
 - 29.4.** The City of San Diego's Labor Compliance Program and the State of California Labor Code §§1771.5(b) and 1776.
 - 29.5.** Sections 1777.5, 1777.6, and 1777.7 of the State of California Labor Code concerning the employment of apprentices by contractors and subcontractors performing public works contracts.
 - 29.6.** The City's Equal Benefits Ordinance (EBO), Chapter 2, Article 2, Division 43 of The San Diego Municipal Code (SDMC).
 - 29.7.** The City's Information Security Policy (ISP) as defined in the City's Administrative Regulation 90.63.
- 30. PRE-AWARD ACTIVITIES:**
- 30.1.** The selected contractor by the City to execute a contract for this Work shall provide the information required within the time specified in "Required Documents," of this bid package. Failure to provide the information within the time specified may result in the Bid being rejected as **non-responsive**.
 - 30.2.** If the Bid is rejected as non-responsive, the selected contractor by the City to execute a contract for this Work shall forfeit the required Bid. The decision that the selected contractor by the City to execute a contract for this Work is non-responsive for failure to provide the information required within the time specified shall be at the sole discretion of the City.
- 31. REDEVELOPMENT-FUNDED PROJECTS:** This contract is funded with monies presently available or anticipated to become available, to the Successor Agency and may become subject to termination or suspension for loss of project funds. See 6-5.9, "Successor's Agency Right to Terminate or Suspend for Loss of Project Funds" for more details.
- 32. ADDITIVE/DEDUCTIVE ALTERNATES:**
- 32.1.** The additive/deductive alternates have been established to allow the Successor Agency to compare the cost of specific portions of the Work with the Project's budget and enable the Successor Agency to make decision prior to award. The award will be established as described in the Bid. The City reserves the right to award the Contract for the Base Bid only or the Base Bid plus any combination of Additive and Deductive Alternate(s).

33. REQUIRED DOCUMENT SCHEDULE:

33.1. The Bidder's attention is directed to the City's Municipal Code §22.0807(e), (3)-(5) for important information regarding grounds for debarment for failure to submit required documentation.

33.2. The specified Equal Opportunity Contracting Program (EOCP) forms are available for download from the City's web site at:

<http://www.sandiego.gov/eoc/forms/index.shtml>

ITEM	WHEN DUE	FROM	DOCUMENT TO BE SUBMITTED
1.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Bid
2.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Bid Bond
3.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Non-collusion Affidavit to be Executed By Bidder and Submitted with Bid under 23 USC 112 and PCC 7106
4.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Contractors Certification of Pending Actions
5.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Equal Benefits Ordinance Certification of Compliance
6.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Form AA35 - List of Subcontractors
7.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Form AA40 - Named Equipment/Material Supplier List
8.	BID SUBMITTAL DATE/TIME	ALL BIDDERS	Form AA45 - Subcontractors Additive/Deductive Alternate
9.	WITHIN 3 WORKING DAYS OF BID OPENING	ALL BIDDERS	SLBE Good Faith Efforts Documentation
10.	WITHIN 3 WORKING DAYS OF BID OPENING WITH GOOD FAITH EFFORT DOCUMENTATION	ALL BIDDERS	Form AA60 – List of Work Made Available
11.	WITHIN 3 WORKING DAYS OF BID OPENING WITH GOOD FAITH EFFORT DOCUMENTATION	ALL BIDDERS	Proof of Valid DBE-MBE-WBE-DVBE Certification Status e.g., Certs.
12.	PRIOR TO PRE-CONSTRUCTION MEETING	LOW BIDDER	<ul style="list-style-type: none"> Manufacturer Certification per Section 500-1.1.2.1

ITEM	WHEN DUE	FROM	DOCUMENT TO BE SUBMITTED
13.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Names of the principal individual owners of the Apparent Low Bidder
14.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	If the Contractor is a Joint Venture: <ul style="list-style-type: none"> • Joint Venture Agreement • Joint Venture License
15.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Form BB05 - Work Force Report
16.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contract Forms - Agreement
17.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contract Forms - Payment and Performance Bond
18.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Certificates of Insurance and Endorsements
19.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contractor Certification - Drug-Free Workplace
20.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contractor Certification - American with Disabilities Act
21.	WITHIN 10 WORKING DAYS AFTER RECEIPT BY BIDDER OF CONTRACT FORMS	APPARENT LOW BIDDER	Contractors Standards - Pledge of Compliance

**CONTRACT FORMS
AGREEMENT**

CONTRACT FORMS

CONSTRUCTION CONTRACT

This contract is made and entered into between THE CITY OF SAN DIEGO, SOLELY IN ITS CAPACITY AS THE DESIGNATED SUCCESSOR AGENCY OF THE REDEVELOPMENT AGENCY OF THE CITY OF SAN DIEGO, A FORMER PUBLIC BODY, CORPORATE AND POLITIC, herein called "Successor Agency", and BARNHART-REESE CONSTRUCTION, INC., herein called "Contractor" for construction of **Fire Station No. 2 (Bayside)** Bid No. **K-16-6523-DBB-3** in the amount of FOURTEEN MILLION SIX HUNDRED TEN THOUSAND NINE HUNDRED EIGHTY-NINE DOLLARS AND 00/100 (\$14,610,989.00), which is comprised of the Base Bid plus Additive Alternates A.

IN CONSIDERATION of the payments to be made hereunder and the mutual undertakings set forth herein, the parties hereto agree as follows:

1. The following are incorporated into this contract as though fully set forth herein:
 - (a) The attached Faithful Performance and Payment Bonds.
 - (b) The attached Proposal included in the Bid documents by the Contractor.
 - (c) Reference Standards listed in the Notice Inviting Bids and the Supplementary Special Provisions (SSP).
 - (d) That certain documents entitled **Fire Station No. 2 (Bayside)**, on file in the office of the Public Works Department as Document No. **23432314**, as well as all matters referenced therein.
2. The Contractor shall perform and be bound by all the terms and conditions of this contract and in strict conformity therewith shall perform and complete in a good and workmanlike manner **Fire Station No. 2 (Bayside)**, Bid Number **K-16-6523-DBB-3**, San Diego, California.
3. For such performances, the Successor Agency shall pay to Contractor the amounts set forth at the times and in the manner and with such additions or deductions as are provided for in this contract, and the Contractor shall accept such payment in full satisfaction of all claims incident to such performances.
4. No claim or suit whatsoever shall be made or brought by Contractor against any officer, agent, or employee of the Successor Agency for or on account of anything done or omitted to be done in connection with this contract, nor shall any such officer, agent, or employee be liable hereunder.
5. This contract is effective as of the date that the designee of the Successor Agency signs the agreement.

CONTRACT FORMS (continued)

IN WITNESS WHEREOF, this Agreement is signed by the Successor Agency, acting by and through its Mayor or designee, pursuant to Municipal Code §22.3102 authorizing such execution.

**THE CITY OF SAN DIEGO SOLELY IN ITS
CAPACITY AS THE DESIGNATED
SUCCESSOR AGENCY OF THE
REDEVELOPMENT AGENCY OF THE
CITY OF SAN DIEGO, A FORMER PUBLIC
BODY, CORPORATE AND POLITIC**

APPROVED AS TO FORM

By David Graham

Jan I. Goldsmith, City Attorney
By Mark W. Morse

Print Name: David Graham
Mayor or designee

Print Name: Mark W. Morse
Deputy City Attorney

Date: _____

Date: 12/3/15

CONTRACTOR

By West Reese

Print Name: West Reese

Title: CEO

Date: 11-16-15

City of San Diego License No.: B2009008065

State Contractor's License No.: 912130

CONTRACT FORMS
ATTACHMENTS

CONTRACT FORMS ATTACHMENTS
PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

Barnhart-Reese Construction, Inc., a corporation, as principal, and
Federal Insurance Company, a corporation authorized to do
business in the State of California, as Surety, hereby obligate themselves, their successors and
assigns, jointly and severally, to The City of San Diego acting as the Successor Agency of the
Redevelopment Agency of the City of San Diego in the sum of
Fourteen Million Six Hundred Ten Thousand Nine Hundred Eighty Nine and 0/100 (\$14,610,989.00) for the faithful performance of the
annexed contract, and in the sum of Fourteen Million Six Hundred Ten Thousand Nine Hundred
Eighty Nine and 0/100 (\$14,910,898.00) for the
benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract **Fire Station No. 2 (Bayside)**,
Bid Number **K-16-6523-DBB-3**, San Diego, California then the obligation herein with respect to a
faithful performance shall be void; otherwise it shall remain in full force.

If the Principal shall promptly pay all persons, firms and corporations furnishing materials for
or performing labor in the execution of this contract, and shall pay all amounts due under the
California Unemployment Insurance Act then the obligation herein with respect to laborers and
materialmen shall be void; otherwise it shall remain in full force.

The obligation herein with respect to laborers and materialmen shall inure to the benefit of all
persons, firms and corporations entitled to file claims under the provisions of Chapter 3 of Division 5
of Title I of the Government Code of the State of California or under the provisions of Section 3082
et seq. of the Civil Code of the State of California.

Changes in the terms of the annexed contract or specifications accompanying same or
referred to therein shall not affect the Surety's obligation on this bond, and the Surety hereby waives
notice of same.

CONTRACT FORMS ATTACHMENTS (continued)
PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND

The Surety shall pay reasonable attorney's fees should suit be brought to enforce the provisions of this bond.


Dated November 9, 2015

Approved as to Form


Barnhart-Reese Construction, Inc.
Principal

By 
Tamela Barnhart-Reese
Printed Name of Person Signing for Principal

Jan I. Goldsmith, City Attorney

By 
Deputy City Attorney

Federal Insurance Company
Surety

By 
Attorney-in-fact
Heather Saltarelli

Approved:

555 South Flower Street, 3rd Floor
Local Address of Surety

By 
Mayor or Designee

Los Angeles, CA 90071
Local Address (City, State) of Surety

(213) 612-5574
Local Telephone No. of Surety

Premium \$ 90,530.00

Bond No. 82320477

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)

County of Orange)

On NOV 09 2015 before me, Rhonda C. Abel, Notary Public
Date Here Insert Name and Title of the Officer

personally appeared Heather Saltarelli
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(x) whose name(x) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature *Rhonda C. Abel*
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Corporate Officer — Title(s): _____

Partner — Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____

Signer's Name: _____

Corporate Officer — Title(s): _____

Partner — Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____



**Chubb
Surety**

**POWER
OF
ATTORNEY**

**Federal Insurance Company
Vigilant Insurance Company
Pacific Indemnity Company**

**Attn: Surety Department
15 Mountain View Road
Warren, NJ 07059**

Know All by These Presents, That **FEDERAL INSURANCE COMPANY**, an Indiana corporation, **VIGILANT INSURANCE COMPANY**, a New York corporation, and **PACIFIC INDEMNITY COMPANY**, a Wisconsin corporation, do each hereby constitute and appoint **Rhonda C. Abel, Jeri Apodaca, Kim Luu, Mike Parizino, Rachelle Rheault, Heather Saltarelli and James A. Schaller of Newport Beach, California**

each as their true and lawful Attorney- In- Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY** have each executed and attested these presents and affixed their corporate seals on this **11th** day of **July, 2013**.

Dawn M. Chloros
Dawn M. Chloros, Assistant Secretary

David B. Norris, Jr.
David B. Norris, Jr., Vice President

STATE OF NEW JERSEY
County of Somerset ss.

On this **11th** day of **July, 2013** before me, a Notary Public of New Jersey, personally came Dawn M. Chloros, to me known to be Assistant Secretary of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY**, the companies which executed the foregoing Power of Attorney, and the said Dawn M. Chloros, being by me duly sworn, did depose and say that she is Assistant Secretary of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY** and knows the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of the By- Laws of said Companies; and that she signed said Power of Attorney as Assistant Secretary of said Companies by like authority; and that she is acquainted with David B. Norris, Jr., and knows him to be Vice President of said Companies; and that the signature of David B. Norris, Jr., subscribed to said Power of Attorney is in the genuine handwriting of David B. Norris, Jr., and was thereto subscribed by authority of said By- Laws and in deponent's presence.

Notarial Seal



**KATHERINE J. ADELAAR
NOTARY PUBLIC OF NEW JERSEY
No 2316685
Commission Expires July 16, 2014**

Kath J Adelaar
Notary Public

CERTIFICATION

Extract from the By- Laws of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY**:

"All powers of attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman or the President or a Vice President or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the following officers: Chairman, President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Assistant Secretaries or Attorneys- in- Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached."

I, Dawn M. Chloros, Assistant Secretary of **FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY** (the "Companies") do hereby certify that

- (i) the foregoing extract of the By- Laws of the Companies is true and correct,
- (ii) the Companies are duly licensed and authorized to transact surety business in all 50 of the United States of America and the District of Columbia and are authorized by the U.S. Treasury Department; further, Federal and Vigilant are licensed in the U.S. Virgin Islands, and Federal is licensed in American Samoa, Guam, Puerto Rico, and each of the Provinces of Canada except Prince Edward Island; and
- (iii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Warren, NJ this

NOV 09 2015



Dawn M. Chloros
Dawn M. Chloros, Assistant Secretary

IN THE EVENT YOU WISH TO NOTIFY US OF A CLAIM, VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT ADDRESS LISTED ABOVE, OR BY Telephone (908) 903- 3493 Fax (908) 903- 3656 e-mail: surety@chubb.com

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of San Diego)

On November 16, 2015 before me, Cathy C. Pernicano, Notary Public
Date Here Insert Name and Title of the Officer

personally appeared Tamela Barnhart Reese
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature Cathy C. Pernicano
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____
Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
 Corporate Officer — Title(s): _____
 Partner — Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

Signer's Name: _____
 Corporate Officer — Title(s): _____
 Partner — Limited General
 Individual Attorney in Fact
 Trustee Guardian or Conservator
 Other: _____
Signer Is Representing: _____

SCOPE OF WORK

1. **SCOPE OF WORK:** The project is located at the southeast corner of Pacific Highway and Cedar Street and will consist of a three-story, 15,980 square-foot fire station, over a single level of below-grade parking (8,970 square feet), including lobby/reception, apparatus bays, living rooms, kitchen, office spaces, exercise room, and sleeping dormitories. The building will include sustainability features, including a green roof and photovoltaic system, resulting in LEED Silver certification.

1.1. The Work shall be performed in accordance with:

1.1.1. The Notice Inviting Bids and Plans numbered 36531-1-D through 36531-26-D; 36531-T01-D through 36531-T07-D; C-1 through C-5; T-0.0 through T-1.2; L-1.0 through L-3.2; A-0.0 through A-11.4; S0.1 through S9.2; M0.1 through M6.2; P0.1 through P5.2; and E0.1 through E8.3,

2. **CONSTRUCTION COST:** The City's estimated construction cost for this contract is **\$14,852,000**

3. **LOCATION OF WORK:** The location of the Work is as follows:

Southwest corner of the intersection of Cedar Street and Pacific Highway.

4. **CONTRACT TIME:** The Contract Time for completion of the Work shall be **400 Working Days**.

5. **CONTRACTOR'S LICENSE CLASSIFICATION:** In accordance with the provisions of California Law, the Contractor shall possess valid appropriate license(s) at the time that the Bid is submitted. Failure to possess the specified license(s) shall render the Bid as **non-responsive** and shall act as a bar to award of the Contract to any Bidder not possessing required license(s) at the time of Bid.

5.1. The City has determined the following licensing classifications for this contract:

Option	Classifications
1	CLASS A
2	CLASS B

5.2. The Bidder shall satisfy the licensing requirement by meeting **at least** one of the listed options.

ATTACHMENT A
SCOPE OF WORK

ATTACHMENTS

AFFIDAVIT OF DISPOSAL

WHEREAS, on the _____ DAY OF _____, the undersigned entered into and executed a contract with the Successor Agency, for:

Fire Station No. 2 (Bayside)

(Name of Project)

as particularly described in said contract and identified as Bid No. **K-16-6523-DBB-3** SAP No. (WBS/IO/CC) **23432314** and WHEREAS, the specification of said contract requires the Contractor to affirm that "all brush, trash, debris, and surplus materials resulting from this project have been disposed of in a legal manner"; and WHEREAS, said contract has been completed and all surplus materials disposed of:

NOW, THEREFORE, in consideration of the final payment by the Successor Agency to said Contractor under the terms of said contract, the undersigned Contractor, does hereby affirm that all surplus materials as described in said contract have been disposed of at the following location(s)

and that they have been disposed of according to all applicable laws and regulations.

Dated this _____ DAY OF _____, _____.

by _____ Contractor

ATTEST:

State of _____
County of _____

On this _____ DAY OF _____, 2_____, before the undersigned, a Notary Public in and for said County and State, duly commissioned and sworn, personally appeared _____ known to me to be the _____ Contractor named in the foregoing Release, and whose name is subscribed thereto, and acknowledged to me that said Contractor executed the said Release.

Notary Public in and for said County and State

CONTRACTOR CERTIFICATION

CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE

PROJECT TITLE: Fire Station No. 2 (Bayside)

I declare under penalty of perjury that I am authorized to make this certification on behalf of Barnhart-Reese Construction, Inc., as Contractor, that I am familiar with the requirements of City of San Diego Municipal Code § 22.3004 regarding Contractor Standards as outlined in the WHITEBOOK, Section 7-13.4, ("Contractor Standards"), of the project specifications, and that Contractor has complied with those requirements.

I further certify that each of the Contractor's subcontractors whose subcontracts are greater than \$50,000 in value has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3004.

Dated this 16th Day of November, 2015.

Signed West Reese

Printed Name West Reese

Title CEO

CONTRACTOR CERTIFICATION

AMERICAN WITH DISABILITIES ACT (ADA) COMPLIANCE CERTIFICATION

PROJECT TITLE: Fire Station No. 2 (Bayside)

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-4 regarding the American With Disabilities Act (ADA) outlined in the WHITEBOOK, Section 7-13.2, "American With Disabilities Act", of the project specifications, and that;

Barnhart-Reese Construction, Inc.

(Name under which business is conducted)

has in place workplace program that complies with said policy. I further certify that each subcontract agreement for this project contains language which indicates the subcontractor's agreement to abide by the provisions of the policy as outlined.

Signed West Reese

Printed Name West Reese

Title CEO

CONTRACTOR CERTIFICATION

DRUG-FREE WORKPLACE

PROJECT TITLE: Fire Station No. 2 (Bayside)

I hereby certify that I am familiar with the requirements of San Diego City Council Policy No. 100-17 regarding Drug-Free Workplace as outlined in the WHITEBOOK, Section 7-13.3, "Drug-Free Workplace", of the project specifications, and that;

Barnhart-Reese Construction, Inc.

(Name under which business is conducted)

has in place a drug-free workplace program that complies with said policy. I further certify that each subcontract agreement for this project contains language which indicates the subcontractor's agreement to abide by the provisions of subdivisions a) through c) of the policy as outlined.

Signed West Reese

Printed Name West Reese

Title CEO

ATTACHMENT B
INTENTIONALLY LEFT BLANK

ATTACHMENT C
EQUAL OPPORTUNITY CONTRACTING PROGRAM

EQUAL OPPORTUNITY CONTRACTING PROGRAM REQUIREMENTS

1. To The WHITEBOOK, Chapter 10, Sections D and E, DELETE each in its entirety, and SUBSTITUTE with the following:

D. CITY'S EQUAL OPPORTUNITY COMMITMENT.

1. Nondiscrimination in Contracting Ordinance.

1. The Contractor, Subcontractors and Suppliers shall comply with requirements of the City's Nondiscrimination in Contracting Ordinance, San Diego Municipal Code §§22.3501 through 22.3517.

The Contractor shall not discriminate on the basis of race, gender, religion, national origin, ethnicity, sexual orientation, age, or disability in the solicitation, selection, hiring, or treatment of subcontractors, vendors, or suppliers. The Contractor shall provide equal opportunity for subcontractors to participate in subcontracting opportunities. The Contractor understands and agrees that violation of this clause shall be considered a material breach of the contract and may result in contract termination, debarment, or other sanctions.

The Contractor shall include the foregoing clause in all contracts between the Contractor and Subcontractors and Suppliers.

2. Disclosure of Discrimination Complaints. As part of its Bid or Proposal, the Bidder shall provide to the City a list of all instances within the past 10 years where a complaint was filed or pending against Bidder in a legal or administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors, or suppliers, and a description of the status or resolution of that complaint, including any remedial action taken.
3. Upon the City's request, the Contractor agrees to provide to the City, within 60 days, a truthful and complete list of the names of all Subcontractors and Suppliers that the Contractor has used in the past 5 years on any of its contracts that were undertaken within San Diego County, including the total dollar amount paid by the Contractor for each subcontract or supply contract.
4. The Contractor further agrees to fully cooperate in any investigation conducted by the City pursuant to the City's Nondiscrimination in Contracting Ordinance, Municipal Code §§22.3501 through 22.3517. The Contractor understands and agrees that violation of this clause shall be considered a material breach of the Contract and may result in remedies being ordered against the Contractor up to and including contract termination, debarment and other sanctions for violation of the provisions of the Nondiscrimination in Contracting Ordinance. The Contractor further understands and agrees that the procedures, remedies and sanctions provided for in the Nondiscrimination in Contracting Ordinance apply only to violations of the Ordinance.

E. EQUAL EMPLOYMENT OPPORTUNITY OUTREACH PROGRAM.

1. The Contractor, Subcontractors and Suppliers shall comply with the City's Equal Employment Opportunity Outreach Program, San Diego Municipal Code §§22.2701 through 22.2707.

The Contractor shall not discriminate against any employee or applicant for employment on any basis prohibited by law. Contractor shall provide equal opportunity in all employment practices. Prime Contractor shall ensure their subcontractors comply with this program. Nothing in this section shall be interpreted to hold a prime contractor liable for any discriminatory practice of its subcontractors.

The Contractor shall include the foregoing clause in all contracts between the Contractor and Subcontractors and Suppliers.

2. If the Contract is competitively solicited, the selected Bidder shall submit a Work Force Report (Form BB05), within 10 Working Days after receipt by the Bidder of Contract forms to the City for approval as specified in the Notice of Intent to Award letter from the City.
3. If a Work Force Report is submitted, and the City determines there are under-representations when compared to County Labor Force Availability data, the selected Bidder shall submit an Equal Employment Opportunity Plan.
4. If the selected Bidder submits an Equal Employment Opportunity Plan, it shall include the following assurances:
 1. The Contractor shall maintain a working environment free of discrimination, harassment, intimidation and coercion at all sites and in all facilities at which the Contractor's employees are assigned to work.
 2. The Contractor reviews its EEO Policy, at least annually, with all on-site supervisors involved in employment decisions.
 3. The Contractor disseminates and reviews its EEO Policy with all employees at least once a year, posts the policy statement and EEO posters on all company bulletin boards and job sites, and documents every dissemination, review and posting with a written record to identify the time, place, employees present, subject matter, and disposition of meetings.
 4. The Contractor reviews, at least annually, all supervisors' adherence to and performance under the EEO Policy and maintains written documentation of these reviews.
 5. The Contractor discusses its EEO Policy Statement with subcontractors with whom it anticipates doing business, includes the EEO Policy Statement in its subcontracts, and provides such documentation to the City upon request.

6. The Contractor documents and maintains a record of all bid solicitations and outreach efforts to and from subcontractors, contractor associations and other business associations.
7. The Contractor disseminates its EEO Policy externally through various media, including the media of people of color and women, in advertisements to recruit, maintains files documenting these efforts, and provides copies of these advertisements to the City upon request.
8. The Contractor disseminates its EEO Policy to union and community organizations.
9. The Contractor provides immediate written notification to the City when any union referral process has impeded the Contractor's efforts to maintain its EEO Policy.
10. The Contractor maintains a current list of recruitment sources, including those outreaching to people of color and women, and provides written notification of employment opportunities to these recruitment sources with a record of the organizations' responses.
11. The Contractor maintains a current file of names, addresses and phone numbers of each walk-in applicant, including people of color and women, and referrals from unions, recruitment sources, or community organizations with a description of the employment action taken.
12. The Contractor encourages all present employees, including people of color and women employees, to recruit others.
13. The Contractor maintains all employment selection process information with records of all tests and other selection criteria.
14. The Contractor develops and maintains documentation for on-the-job training opportunities, participates in training programs, or both for all of its employees, including people of color and women, and establishes apprenticeship, trainee, and upgrade programs relevant to the Contractor's employment needs.
15. The Contractor conducts, at least annually, an inventory and evaluation of all employees for promotional opportunities and encourages all employees to seek and prepare appropriately for such opportunities.
16. The Contractor ensures the company's working environment and activities are non-segregated except for providing separate or single-user toilets and necessary changing facilities to assure privacy between the sexes.

ATTACHMENT D
INTENTIONALLY LEFT BLANK

ATTACHMENT E
SUPPLEMENTARY SPECIAL PROVISIONS

SUPPLEMENTARY SPECIAL PROVISIONS

The following Supplementary Special Provisions (SSP) modifies the following documents:

- 1) Standard Specifications for Public Works Construction (The GREENBOOK) currently in effect.
- 2) The City of San Diego Standard Specifications for Public Works Construction (The WHITEBOOK).

SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

1-2 TERMS AND DEFINITIONS. ADD the following:

Civic San Diego: Administrator of the Project.

Owner: Successor Agency.

Successor Agency: The City of San Diego, solely in its capacity as the designated Successor Agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic.

Normal Working Hours. To the City Supplement, ADD the followings

Night and Weekend Work: Construction in the ROW may be performed at night or on weekends at no extra costs to the Agency. The Contractor must have prior authorization from the Resident Engineer and the City Traffic Engineer to perform Work on weekends or at night. In addition, the Contractor will be required to obtain a Noise Abatement Permit to perform Work outside the normal working hours. The Contractor shall be aware that some work may be required at night for traffic control purposes. Cost of the permits shall be included in the various unit price Bid items for the Work.

SECTION 2 - SCOPE AND CONTROL OF WORK

2-3.2 Self Performance. DELETE in its entirety and SUBSTITUTE with the following:

1. You must perform, with your own organization, Contract work amounting to at least 50% of the base bid alone or base bid and any additive or deductive alternate(s) that together when added or deducted form the basis of award.
2. The self performance percentage requirement will be waived for contracts when a "B" License is required or allowed.

2-5.3 Submittals.

2-5.3.1 General. To the City Supplement, ADD the following

7. For products for which an AML is available, products listed in the AML shall be used. A submittal review will be conducted for products not identified on an AML on a case-by-case basis when:
 - a) The product type or category is not in the AML.
 - b) The AML does not list at least two available manufacturers of the product.
 - c) The material or manufacturer listed in the AML is no longer available. Documentation to substantiate the product is no longer available or in production is required as part of the submittal.

In the case of conducting a submittal review when required by the Plans or Special Provisions, or when requested by the Engineer, all submittals shall be accompanied by the City's submittal form.

The Product Submittal Form is available for download at:

<http://www.sandiego.gov/publicworks/edocref/index.shtml>

2-6 WORK TO BE DONE. To the City Supplement, ADD the following

4. ALTERNATE BID ITEMS

- A. Additive Alternate A Scope of Work: The Contractor shall insert the cost to remove and replace the existing pavement on Cedar Street per the contract documents.

5. COODINATION BY THE CONTRACTOR

- A. The Project is subject to City of San Diego Council Policy 900-11, "Inclusion of Public Art in Selected Capital Improvements Program." Therefore, an artist team has developed an artwork design and will receive a contract from Civic San Diego to provide artwork fabrication and installation services. The resultant artwork will become an acquisition of the Civic Art Collection which is managed by the Commission for Arts and Culture. The Contractor should account for time and materials necessary for coordinating with the artist team on the integration of the public artwork throughout the duration of the project.
- B. The Contractor is required to purchase all furniture, fixtures and equipment (FF&E) and a fire engine. The Contractor is responsible for any coordination with the City Fire Department or its designee and any fees associated with this effort. See section 01 02 50

2-7

SUBSURFACE DATA. ADD the following:

4. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests of subsurface conditions at the Work Site:
 1. Geotechnical and Fault Investigation dated April 3, 2009 by Leighton and Associates.
5. The report(s) listed above is(are) available for review by contacting the Contract Specialist or visiting:

<ftp://ftp.sannet.gov/OUT/ECP/2-7%20SUBSURFACE%20DATA/>

or the report listed above is available as Appendix G.

2-9.1

Permanent Survey Markers. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

Pursuant to Division 3, Chapter 15 of the Business and Professions Code, the Contractor shall not disturb survey monuments that “control the location of subdivisions, tracts, boundaries, roads, streets, or highways, or provide horizontal or vertical survey control” until they have been tied out by a Registered Land Surveyor or Registered Civil Engineer authorized to practice land surveying within the State of California.

Monument Preservation will be performed by City Public Works Field Engineering Division (PW-FED) Field Survey Section on all Projects, unless permission is obtained for these services in writing by PW-FED.

The Contractor shall submit to the Engineer a minimum of 7 Days prior to the start of the Work a list of controlling survey monuments which may be disturbed. The Agency (or the owner on a Private Contract) will:

- a) set survey points outside the affected work area that reference and locate each controlling survey monument that may be disturbed,
- b) file a Corner Record or Record of Survey with the County Surveyor after setting the survey points to be used for re-establishment of the disturbed controlling survey monuments, and
- c) file a Corner Record of Record of Survey with the County Surveyor after re-establishment of the disturbed controlling survey monuments.

2-9.2

Survey Service. DELETE in its entirety and SUBSTITUTE with the following:

Prior to start of construction, you shall submit a letter to the Engineer identifying the Licensed Land Surveyor or the Registered Civil Engineer authorized to practice land surveying within the State of California performing the survey services for the Project.

You are responsible for performing and meeting the accuracy of surveying standards adequate for construction through a Licensed Land Surveyor or a Registered Civil Engineer authorized to practice land surveying within the State of California.

Survey stakes shall be set and stationed by you for curbs, headers, water mains, sewers, storm drains, structures, rough grade, and any other structures and appurtenances that are needed for the Project. A corresponding cut or fill to finished grade (or flow line) must be indicated on a grade sheet.

Surveys performed must list the basis of bearings as tied to Record of Survey 14492 or equivalent, based on the California Coordinate System of 1983, Zone 6, U.S. Survey foot, epoch 1991.35, along with a completed calibration sheet (blank form will be supplied by City Surveys). The vertical datum used must be NGVD 29 in accordance with the City of San Diego Vertical Bench Book.

You shall preserve construction survey stakes, control points and other survey related marks for the duration of the Project. If any construction survey stakes are lost or disturbed, and need to be replaced, such replacement will be performed by the Engineer at your expense.

2-9.2.1

Survey Files. All Computer Aided Drafting (CAD) work must be done in accordance with The City of San Diego's Citywide Computer Aided Design and Drafting (CADD) Standards and must be in City seed files (.job, .txt, .dgn, .alg, .raw, .fwd, .dtm, .pdf, .docx, .xlsx, .tif, and .jpg).

All survey files must be completed in accordance with the City of San Diego's Citywide CADD Standards and must adhere to City's Microstation level and attribute structure.

The survey file deliverable will be either one Master .dgn file containing all xref's in geospatially referenced (and attached) models or one Master dgn with all xref's geospatially referenced (and attached) as dgn files. Resource files will be sent to Contractor if requested.

Survey files must include, but not limited to, the following items:

- a. Street center line and (record width) right-of-way lines
- b. Project geometry (.alg) files (this will be generated for use in InRoads)
- c. 3D surface model (.dtm, break line and spot elevation) file
- d. Spot elevations of the new utility main at each intersection, midblock and for any change in grade
- e. Monuments
- f. Curb lines (top curb and gutter)
- g. All other appurtenances including but not limited to water valves, meters, vaults, manholes, fire hydrants, utility boxes, cleanouts and poles

You shall use the survey information to produce red-lines drawings as described in Section 2-5.4 "Red-Lines and Record Documents."

2-9.2.2 Submittal. Survey files shall be submitted in accordance with Section 2-5.3 "Submittals" and 2-5.4 "Red-Lines and Record Documents." You shall provide the Survey Files, proposed Drawings and or Red-Line Drawings on a CD/DVD to the Engineer and post the Survey Files, proposed Drawings and or Red-Line Drawings at the following website:

<ftp://ftp.sannet.gov/IN/SURVEYS/>.

After the documents have been posted the website, you shall send a confirmation email, which includes the hyperlink to the website, to the Engineer and SurveyReview@sandiego.gov.

All survey work and submittals which reveal non-compliance with the requirements of the Construction Documents shall be corrected as deemed necessary by the Engineer and the cost of the corrections to your survey submittals will be at your expense.

2-9.2.3 Payment. Payment for survey services shall be included in the lump sum Bid for "Field Surveys".

2-10 AUTHORITY OF BOARD AND ENGINEER. ADD the following:

The Resident Engineer is the representative of the Successor Agency authorized to advise the Agency on construction matters related to the Contract. The Agency has delegated his authority to the Resident Engineer to make initial decisions regarding questions, which may arise as to the quality or acceptability of materials furnished and Work performed, as to the manner of performance, and rate of progress of the Work under the Contract. The Resident Engineer interprets the Contract Documents and makes initial decisions with respect to the Contractor's fulfillment of the Contract obligations and the Contractor's entitlement to compensation. The Contractor shall look initially to the Resident Engineer in matters relating to the Contract.

2-10.1 Rejected Work. The Agency may reject all work that is not done in accordance with the Contract. All work that has been rejected shall be remedied or removed and replaced by the Contractor in an acceptable manner and no compensation will be allowed for such removal, replacement or remedial work.

Any work done beyond the boundaries established by the Agency or any work as hereinafter specified which is done without proper permits, inspection and testing, will be considered as unauthorized work and will be rejected. Upon order of the Agency, unauthorized work shall be remedied, removed, or replaced at the Contractor's expense.

Upon failure of the Contractor to comply promptly with an order, the Agency may cause rejected or unauthorized work to be remedied, removed, or replaced, and deduct the costs from any monies due or to become due to the Contractor.

2-15 TECHNICAL STUDIES AND DATA. To the City Supplement, ADD the following:

5. In preparation of the Contract Documents, the designer has relied upon the following reports of explorations and tests at the Work Site:
 1. Geotechnical and Fault Investigation, dated April 3, 2009 by Leighton and Associates.
6. The report(s) listed above is(are) available for review by contacting the Contract Specialist or visiting:

<ftp://ftp.sannet.gov/OUT/ECP/2-7%20SUBSURFACE%20DATA/>

or the report listed above is available as Appendix G.

SECTION 4 - CONTROL OF MATERIALS

4-1.6 Trade Names or Equals. ADD the following:

You must submit your list of proposed substitutions for “an equal” (“or equal”) item(s) **no later than 5 Working Days after the determination of the Apparent Low Bidder** and on the City’s Product Submittal Form available at:

<http://www.sandiego.gov/publicworks/edocref/index.shtml>

SECTION 6 - PROSECUTION, PROGRESS AND ACCEPTANCE OF WORK

6-1.1 Construction Schedule. ADD the following:

The Schedule shall reflect that all construction on the Northeast corner of Pacific Highway and Cedar Street shall be completed prior to any sidewalk construction or sidewalk closures on the South side of Pacific Highway.

6-2.1 Moratoriums. To the City Supplement, ADD the following:

Do not work in the areas where there is currently a moratorium issued by the City. The areas subject to moratorium are listed here:

Cedar Street or Pacific Highway from Thanksgiving to New Years Day (inclusive).

Construction activities shall not interfere with any scheduled civic event in or around the construction area. The Contractor is responsible for coordination of construction activities with the City of San Diego City Manager's Civic Events Coordinator to ensure construction activities do not conflict with any civic events in the project area. No additional compensation shall be allowed for delays or changes to the construction schedule due to scheduled civic events.

A waiver may be granted to the Contractor if it can be demonstrated that the work will not impact City activities.

6-7.1 General. To the City Supplement, ADD the following:

5. 30 Working days for full depth asphalt final mill and resurfacing work required per SDG-107.

SECTION 7 - RESPONSIBILITIES OF THE CONTRACTOR

7-3 LIABILITY INSURANCE. DELETE in its entirety and SUBSTITUTE with the following:

The insurance provisions herein must not be construed to limit your indemnity obligations contained in the Contract.

7-3.1 Policies and Procedures.

1. You must procure the insurance described below, at its sole cost and expense, to provide coverage against claims for loss including injuries to persons or damage to property, which may arise out of or in connection with the performance of the Work by you, your agents, representatives, officers, employees or Subcontractors.
2. Insurance coverage for property damage resulting from your operations is on a replacement cost valuation. The market value will not be accepted.
3. You must maintain this insurance for the duration of this contract and at all times thereafter when you are correcting, removing, or replacing Work in accordance with this contract. Your liabilities under the Contract, e.g., your indemnity obligations, is not deemed limited to the insurance coverage required by this contract.
4. Payment for insurance is included in the various items of Work as bid by you, and except as specifically agreed to by the City in writing, you are not entitled to any additional payment. Do not begin any work under this contract until you have provided and the City has approved all required insurance.
5. Policies of insurance must provide that the City is entitled to 30 days (10 days for cancellation due to non-payment of premium) prior written notice of cancellation or non-renewal of the policy. Maintenance of specified insurance coverage is a material element of the Contract. Your failure to maintain or renew coverage or to provide evidence of renewal during the term of the Contract may be treated by the City as a material breach of the Contract.

7-3.2 Types of Insurance.

7-3.2.1 Commercial General Liability Insurance.

1. Commercial General Liability Insurance must be written on the current version of the ISO Occurrence form CG 00 01 07 98 or an equivalent form providing coverage at least as broad.

2. The policy must cover liability arising from premises and operations, XCU (explosions, underground, and collapse), independent contractors, products/completed operations, personal injury and advertising injury, bodily injury, property damage, and liability assumed under an insured's contract (including the tort liability of another assumed in a business contract).
3. There must be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You must maintain the same or equivalent insurance for at least 10 years following completion of the Work.
4. All costs of defense must be outside the policy limits. Policy coverage must be in liability limits of not less than the following:

<u>General Annual Aggregate Limit</u>	<u>Limits of Liability</u>
Other than Products/Completed Operations	\$2,000,000
Products/Completed Operations Aggregate Limit	\$2,000,000
Personal Injury Limit	\$1,000,000
Each Occurrence	\$1,000,000

7-3.2.2

Commercial Automobile Liability Insurance.

1. You must provide a policy or policies of Commercial Automobile Liability Insurance written on the current version of the ISO form CA 00 01 12 90 or later version or equivalent form providing coverage at least as broad in the amount of \$1,000,000 combined single limit per accident, covering bodily injury and property damage for owned, non-owned, and hired automobiles ("Any Auto").
2. All costs of defense must be outside the limits of the policy.

7-3.2.3

Contractors Pollution Liability Insurance.

1. You must procure and maintain at your expense or require Subcontractor, as described below to procure and maintain, the Contractors Pollution Liability Insurance including contractual liability coverage to cover liability arising out of cleanup, removal, storage, or handling of hazardous or toxic chemicals, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than \$2,000,000 limit for bodily injury and property damage.
2. All costs of defense must be outside the limits of the policy. Any such insurance provided by Subcontractor instead of you must be approved separately in writing by the City.
3. For approval of a substitution of Subcontractor's insurance, you must certify that all activities for which the Contractors Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance. The deductible must not exceed \$25,000 per claim.

4. Contractual liability must include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There must be no endorsement or modification of the coverage limiting the scope of coverage for either "insured vs. insured" claims or contractual liability.
5. Occurrence based policies must be procured before the Work commences and must be maintained for the Contract Time. Claims Made policies must be procured before the Work commences, must be maintained for the Contract Time, and must include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies must continue to be maintained for 12 months after the completion of the Work without advancing the retroactive date.
6. Except as provided for under California law, the policy or policies must provide that the City is entitled to 30 days prior written notice (10 days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

7-3.2.4

Contractors Hazardous Transporters Pollution Liability Insurance.

1. You must provide at your expense or require Subcontractor to provide, as described below Contractors Hazardous Transporters Pollution Liability Insurance including contractual liability coverage to cover liability arising out of transportation of hazardous or toxic, materials, substances, or any other pollutants by you or any Subcontractor in an amount not less than \$2,000,000 limit per occurrence/aggregate for bodily injury and property damage.
2. All costs of defense must be outside the limits of the policy. The deductible must not exceed \$25,000 per claim. Any such insurance provided by a subcontractor instead of you must be approved separately in writing by the City.
3. For approval of the substitution of Subcontractor's insurance the Contractor shall certify that all activities for which Contractors Hazardous Transporters Pollution Liability Insurance will provide coverage will be performed exclusively by the Subcontractor providing the insurance.
4. Contractual liability must include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There must be no endorsement or modification of the coverage limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. Occurrence based policies must be procured before the Work commences and must be maintained for the duration of this contract. Claims Made policies must be procured before the Work commences, must be maintained for the duration of this contract, and must include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies must continue to be maintained for 12 months after the completion of the Work under this contract without advancing the retroactive date.

5. Except as provided for under California law, the policy or policies must provide that the City is entitled to 30 days prior written notice (10 days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

7-3.2.5 Contractors Builders Risk Property Insurance.

1. You must provide at its expense, and maintain until Final Acceptance of the Work, a Special Form Builders Risk Policy or Policies. This insurance must be in an amount equal to the replacement cost of the completed Work (without deduction for depreciation) including the cost of excavations, grading, and filling. The policy or policies limits must be 100% of this contract value of the Work plus 15% to cover administrative costs, design costs, and the costs of inspections and construction management.
2. Insured property must include material or portions of the Work located away from the Site but intended for use at the Site, and must cover material or portions of the Work in transit. The policy or policies must include as insured property scaffolding, falsework, and temporary buildings located at the Site. The policy or policies must cover the cost of removing debris, including demolition.
3. The policy or policies must provide that all proceeds thereunder must be payable to the Successor Agency as Trustee for the insured, and must name the City, the Contractor, Subcontractors, and Suppliers of all tiers as named insured. We as Trustee will collect, adjust, and receive all monies which may become due and payable under the policy or policies, may compromise any and all claims thereunder, and will apply the proceeds of such insurance to the repair, reconstruction, or replacement of the Work.
4. Any deductible applicable to the insurance must be identified in the policy or policies documents and responsibility for paying the part of any loss not covered because of the application of such deductibles must be apportioned among the parties except for the Successor Agency as follows: if there is more than one claimant for a single occurrence, then each claimant must pay a pro-rata share of the per occurrence deductible based upon the percentage of their paid claim to the total paid for insured. The Successor Agency must be entitled to 100% of its loss. The Contractor must pay the Successor Agency any portion of that loss not covered because of a deductible, at the same time the proceeds of the insurance are paid to the Successor Agency as trustee.
5. Any insured, other than the Successor Agency, making claim to which a deductible applies must be responsible for 100% of the loss not insured because of the deductible. Except as provided for under California law, the policy or policies must provide that the Successor Agency is entitled to 30 days prior written notice (10 days for cancellation due to non-payment of premium) of cancellation or non-renewal of the policy or policies.

7-3.3 Rating Requirements. Except for the State Compensation Insurance Fund, all insurance required by this contract as described herein must be carried only by responsible insurance companies with a rating of, or equivalent to, at least "A-, VI"

by A.M. Best Company, that are authorized by the California Insurance Commissioner to do business in the State, and that have been approved by the City.

7-3.3.1 Non-Admitted Carriers. The Successor Agency will accept insurance provided by non-admitted, "surplus lines" carriers only if the carrier is authorized to do business in the State and is included on the List of Approved Surplus Lines Insurers (LASLI list).

All policies of insurance carried by non-admitted carriers must be subject to all of the requirements for policies of insurance provided by admitted carriers described herein.

7-3.4 Evidence of Insurance. Furnish to the Successor Agency documents e.g., certificates of insurance and endorsements evidencing the insurance required herein, and furnish renewal documentation prior to expiration of this insurance. Each required document must be signed by the insurer or a person authorized by the insurer to bind coverage on its behalf. We reserve the right to require complete, certified copies of all insurance policies required herein.

7-3.5 Policy Endorsements.

7-3.5.1 Commercial General Liability Insurance

7-3.5.1.1 Additional Insured.

- a) You must provide at your expense policy endorsement written on the current version of the ISO Occurrence form CG 20 10 11 85 or an equivalent form providing coverage at least as broad.
- b) To the fullest extent allowed by law e.g., California Insurance Code §11580.04, the policy must be endorsed to include the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives as additional insured.
- c) The additional insured coverage for projects for which the Engineer's Estimate is \$1,000,000 or more must include liability arising out of: (a) Ongoing operations performed by you or on your behalf, (b) your products, (c) your work, e.g., your completed operations performed by you or on your behalf, or (d) premises owned, leased, controlled, or used by you.
- d) The additional insured coverage for projects for which the Engineer's Estimate is less than \$1,000,000 must include liability arising out of: (a) Ongoing operations performed by you or on your behalf, (b) your products, or (c) premises owned, leased, controlled, or used by you.

7-3.5.1.2 Primary and Non-Contributory Coverage. The policy must be endorsed to provide that the coverage with respect to operations, including the completed operations, if appropriate, of the Named Insured is primary to any insurance or self-insurance of the City, Successor Agency, Civic San Diego and its elected officials, officers, employees, agents and representatives. Further, it must provide that any insurance maintained by the City, Successor Agency, Civic San Diego and its elected officials, officers, employees, agents and representatives must be in excess of your insurance and must not contribute to it.

7-3.5.1.3 Project General Aggregate Limit.

The policy or policies must be endorsed to provide a Designated Construction Project General Aggregate Limit that will apply only to the Work. Only claims payments which arise from the Work must reduce the Designated Construction Project General Aggregate Limit. The Designated Construction Project General Aggregate Limit must be in addition to the aggregate limit provided for the products-completed operations hazard.

7-3.5.2 Commercial Automobile Liability Insurance.

7-3.5.2.1 Additional Insured. Unless the policy or policies of Commercial Auto Liability Insurance are written on an ISO form CA 00 01 12 90 or a later version of this form or equivalent form providing coverage at least as broad, the policy must be endorsed to include the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives as additional insured, with respect to liability arising out of automobiles owned, leased, hired or borrowed by you or on your behalf. This endorsement is limited to the obligations permitted by California Insurance Code §11580.04.

7-3.5.3 Contractors Pollution Liability Insurance Endorsements.

7-3.5.3.1 Additional Insured.

- a) The policy or policies must be endorsed to include as an Insured the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives, with respect to liability arising out of: (a) Ongoing operations performed by you or on your behalf, (b) your products, (c) your work, e.g., your completed operations performed by you or on your behalf, or (d) premises owned, leased, controlled, or used by you; except that in connection with, collateral to, or affecting any construction contract to which the provisions of subdivision (b) of § 2782 of the California Civil Code apply, this endorsement must not provide any duty of indemnity coverage for the active negligence of the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives in any case where an agreement to indemnify the City and its respective elected officials, officers, employees, agents, and representatives would be invalid under subdivision (b) of §2782 of the California Civil Code.
- b) In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives that is not covered because of California Insurance Code §11580.04, the insurer's obligation to the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives must be limited to obligations permitted by California Insurance Code §11580.04.

7-3.5.3.2 Primary and Non-Contributory Coverage. The policy or policies must be endorsed to provide that the insurance afforded by the Contractors Pollution Liability Insurance policy or policies is primary to any insurance or self-insurance of the City, Successor Agency, Civic San Diego and its elected officials, officers, employees, agents and representatives with respect to operations including the completed operations of the Named Insured. Any insurance maintained by the City, Successor Agency, Civic San Diego and its elected officials, officers, employees, agents and representatives must be in excess of your insurance and must not contribute to it.

7-3.5.3.3 Severability of Interest. For Contractors Pollution Liability Insurance, the policy or policies must provide that your insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and must provide cross-liability coverage.

7-3.5.4 Contractors Hazardous Transporters Pollution Liability Insurance Endorsements.

7-3.5.4.1 Additional Insured.

- a) The policy or policies must be endorsed to include as an Insured the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives, with respect to liability arising out of: (a) Ongoing operations performed by you or on your behalf, (b) your products, (c) your work, e.g., your completed operations performed by you or on your behalf, or (d) premises owned, leased, controlled, or used by you; except that in connection with, collateral to, or affecting any construction contract to which the provisions of subdivision (b) of §2782 of the California Civil Code apply, this endorsement must not provide any duty of indemnity coverage for the active negligence of the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives in any case where an agreement to indemnify the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives would be invalid under subdivision (b) of §2782 of the California Civil Code.
- b) In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives that is not covered because of California Insurance Code §11580.04, the insurer's obligation to the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives must be limited to obligations permitted by California Insurance Code §11580.04.

7-3.5.4.2 Primary and Non-Contributory Coverage. The policy or policies must be endorsed to provide that the insurance afforded by the Contractors Pollution Liability Insurance policy or policies is primary to any insurance or self-insurance of the City, Successor Agency, Civic San Diego and its elected officials, officers, employees, agents and representatives with respect to operations including the completed operations of the Named Insured. Any insurance maintained by the City, Successor Agency, Civic San Diego and its elected officials, officers, employees, agents and representatives must be in excess of your insurance and must not contribute to it.

7-3.5.4.3 Severability of Interest. For Contractors Hazardous Transporters Pollution Liability Insurance, the policy or policies must provide that your insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and must provide cross-liability coverage.

7-3.5.5 Builders Risk Endorsements.

7-3.5.5.1 Waiver of Subrogation. The policy or policies must be endorsed to provide that the insurer will waive all rights of subrogation against the City, Successor Agency, Civic San Diego, and its respective elected officials, officers, employees, agents, and representatives for losses paid under the terms of the policy or policies and which arise from work performed by the Named Insured for the City, Successor Agency, Civic San Diego.

7-3.5.5.2 Builders Risk – Partial Utilization. If the Successor Agency desire to occupy or use a portion or portions of the Work prior to Acceptance in accordance with this contract, the Successor Agency will notify you and you must immediately notify your Builder's Risk insurer and obtain an endorsement that the policy or policies must not be cancelled or lapse on account of any such partial use or occupancy. You must obtain the endorsement prior to our occupation and use.

7-3.6 Deductibles and Self-Insured Retentions. You must pay for all deductibles and self-insured retentions. You must disclose deductibles and self-insured retentions to the Successor Agency at the time the evidence of insurance is provided.

7-3.7 Reservation of Rights. The Successor Agency reserves the right, from time to time, to review your insurance coverage, limits, deductibles and self-insured retentions to determine if they are acceptable to the Successor Agency. The Successor Agency will reimburse you, without overhead, profit, or any other markup, for the cost of additional premium for any coverage requested by the Engineer but not required by this contract.

7-3.8 Notice of Changes to Insurance. You must notify the Successor Agency 30 days prior to any material change to the policies of insurance provided under this contract.

7-3.9 Excess Insurance. Policies providing excess coverage must follow the form of the primary policy or policies e.g., all endorsements.

7-4 WORKERS' COMPENSATION INSURANCE. DELETE in its entirety and SUBSTITUTE with the following:

7-4.1 Workers' Compensation Insurance and Employers Liability Insurance.

1. In accordance with the provisions of §3700 of the California Labor Code, you must provide at your expense Workers' Compensation Insurance and Employers Liability Insurance to protect you against all claims under applicable state workers compensation laws. The City, Successor Agency, Civic San Diego and its elected officials, and employees will not be responsible for any claims in law or equity occasioned by your failure to comply with the requirements of this section.

2. Limits for this insurance must be not less than the following:

<u>Workers' Compensation</u>	<u>Statutory Employers Liability</u>
Bodily Injury by Accident	\$1,000,000 each accident
Bodily Injury by Disease	\$1,000,000 each employee
Bodily Injury by Disease	\$1,000,000 policy limit

3. By signing and returning the Contract you certify that you are aware of the provisions of §3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that code and you must comply with such provisions before commencing the Work as required by §1861 of the California Labor Code.

7-4.1.1 Waiver of Subrogation.

The policy or policies must be endorsed to provide that the insurer will waive all rights of subrogation against the City, Successor Agency, Civic San Diego and its respective elected officials, officers, employees, agents, and representatives for losses paid under the terms of the policy or policies and which arise from work performed by the Named Insured for the Successor Agency.

7-5 PERMITS, FEES, AND NOTICES. To the City Supplement, ADD the following:

The Successor Agency will obtain, at no cost to the Contractor; the following permits:

1. The General Building Permit for Fire Station #2

Civic San Diego will be the permit holder prior to contract award. The Contractor shall be required to transfer the 'Permit Holder Name' to their name prior to NTP. The Contractor is responsible for any fees associated with the transfer of the permit.

**ADD:
7-5.4**

Railroad Right Of Entry Permit

The Contractor shall obtain a Right of Entry Permit from the Railroad prior to entering or constructing on property owned by the Railroad. The Contractor shall abide by the terms of the Right of Entry Permit. The terms of the Right of Entry Permit will govern if there are any conflicts with these special provisions. The Contractor must understand the Contractor's right to enter Railroad's right of way is subject to the absolute right of Railroad to cause the Contractor's work on Railroad's right of way to cease if, in the opinion of Railroad, Contractor's activities create a hazard to Railroad's right of way, employees, and operations. The term "Railroad" shall mean the San Diego Metropolitan Transit System (MTS) and North County Transit District (NCTD).

7-8.6 Water Pollution Control. ADD the following:

Based on a preliminary assessment by the City, the Contract is subject to WPCP.

7-10.5.3 Steel Plate Covers. Table 7-10.5.3(A), REVISE the plate thickness for 5'-3" trench width to read 1 3/4".

7-15 INDEMNIFICATION AND HOLD HARMLESS AGREEMENT. To the City Supplement, fourth paragraph, last sentence, DELETE in its entirety and SUBSTITUTE with the following:

Your duty to indemnify and hold harmless does not include any claims or liability arising from the established active or sole negligence, or willful misconduct of the City, its officers, or employees.

7-16 COMMUNITY LIAISON. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

**ADD:
7-16 COMMUNITY OUTREACH.**

7-16.1 General.

1. To ensure consistency with the City's community outreach plan for the project, the Successor Agency will work with the Contractor to inform the public (which includes, but is not limited to, property owners, renters, homeowners, business owners, recreational users, and other community members and stakeholders) of construction impacts. Efforts by the Contractor to mitigate construction impacts by communicating with the public require close coordination and cooperation with the City.
2. You shall perform the community outreach activities required throughout the Contract Time. You shall assign a staff member who will perform the required community outreach services.
3. You shall closely coordinate the Work with the businesses, institutions, residents and property owners impacted by the Project.

Your example duties include notifying businesses, institutions, and residents of the commencement of construction activities not less than 5 days in advance, coordinating access for vehicular and pedestrian traffic to businesses, institutions, and residences impacted by the Project, reporting activities at all Project progress meetings scheduled by the Engineer, attending the Project Pre-construction Meeting, attending 2 community meetings, responding to community questions and complaints related to your activities, and documenting, in writing, as well as logging in all inquiries and complaints received into the City's Public Contact Log located on the City's SDSshare site:

<http://sdshare/forums/ecp/PITS/picr/Lists/Public%20Contact%20Log/AllItems.aspx>.

4. You shall execute the Information Security Policy Acknowledgement Form - For Non-City Employees within 15 days of the award of the Contract if:
 - a) Your contact information is made available on any outreach materials or;
 - b) You will be the primary point of contact to resolve project related inquiries and complaints.
5. Electronic Communication.

All inquiries and complaints will be logged in to the City's SDSShare site within 24 hours of receipt of inquiries and complaints.

Any updates or a resolution of inquiries, and complaints shall be documented in the City's SDSShare site within 24 hours.

Copies of email communications shall be saved, individually, on to the City's SDSShare site as an Outlook Message Format (*.msg).

All graphics, photos, and other electronic files associated with the inquiries and or complaints shall be saved into the individual record.

7-16.1.1 Quality Assurance.

1. During the course of community outreach, you shall ensure that the character of all persons that conduct community outreach (distributing door hangers, attending community meetings, interacting with the public, etc.) on your behalf shall:
 - a. Have the ability to speak and comprehend English and/or Spanish, as appropriate for the community or public they are informing,
 - b. Possess and display easily verifiable and readable personal identification that identifies the person as your employee,
 - c. Have the interpersonal skills to effectively, professionally, and tactfully represent you, the project, and the City to the public.

7-16.1.2 Submittals.

1. You shall submit to the Resident Engineer, for review and approval, all drafts of letters, notices, postcards, door hangers, signs, mailing lists, proposed addresses for hand-delivery, and any other notices and letters that are to be mailed and or distributed to the public.
 - a. Prior to distributing or mailing, you shall submit final drafts of letters, notices, postcards, door hangers, signs, and any other notices and letters to the Resident Engineer for final review and approval. Submit a PDF copy of the approved door hangers to the Engineer.

- b. After distributing or mailing, you shall submit verification of delivery and any copies of returned notices to the Resident Engineer. Submit a PDF copy of the approved letters and notices to the Engineer.
2. You shall use the City's SDSShare site to identify and summarize communications (via phone, in person, and email) with the public within 24 hours of receipt, even if your response to the individual is still incomplete. You shall upload to the City's SDSShare site copies of all written, electronic, and verbal communications and conversations with the public.

7-16.2 Community Outreach Services.

7-16.2.1 Public Notice by Contractor.

1. Post Project Identification Signs in accordance with section 7-10.6.2
2. Notify businesses, institutions, property owners, residents or any other impacted stakeholders, within a minimum 300 feet radius of the Project, of construction activities and utility service interruptions not less than 5 days in advance.
3. Furnish and distribute public notices in the form of door hangers using the City's format to all occupants and/or property owners along streets:
 - a. Where Work is to be performed at least 5 days before starting construction or survey activities or impacting the community as approved by the Resident Engineer.
 - b. Within 5 days of the completion of your construction activities where work was performed, you shall distribute public notices in the form of door hangers, which outlines the anticipated dates of Asphalt Resurfacing or Slurry Seal.
 - c. No less than 48 hours in advance and no more than 72 hours in advance of the scheduled resurfacing.
4. Leave the door hanger notices on or at the front door of each dwelling and apartment unit and at each tenant of commercial buildings abutting each of the street block segments. Where the front doors of apartment units are inaccessible, distribute the door hanger notices to the apartment manager or security officer.
5. Door Hanger Material: You shall use Blanks/USA brand, Item Number DHJ5B6WH, 1 1/4" Holes (removed), 2-up Jumbo Door Hanger in Bristol White, or approved equal.
6. Mailed Notice Material: You shall use Cougar by Domtar, Item Number 2834 or approved equal.
7. For all Work on private property, contact each owner and occupant individually a minimum of 15 days prior to the Work. If the Work has been delayed, re-notify owners and occupants of the new Work schedule, as directed by the Resident Engineer.

7-16.2.2

Communications with the Public.

1. Coordinate access for vehicular and pedestrian traffic to businesses, institutions and residences impacted by the Project.
2. You shall provide updates on construction impacts to the Resident Engineer. You shall notify the Resident Engineer in advance about time-sensitive construction impacts and may be required to distribute construction impact notices to the public on short notice.
3. You shall incorporate community outreach activities related to construction impacts in the baseline schedule and update the Resident Engineer with each week's submittal of the Three-Week Look Ahead Schedule.
4. At the request of the Resident Engineer, you shall attend and participate in project briefings at community meetings.
5. You shall coordinate with the Resident Engineer on all responses and actions taken to address public inquiries and complaints within 24-hours that they are received.

7-16.2.3

Communications with Media.

1. The Successor Agency may allow members of the media access to its construction site(s) on a case-by-case basis only.
2. Occasionally, members of the media may show up at construction sites, uninvited. Members of the media (including, but not limited to newspaper, magazine, radio, television, bloggers, and videographers) do not have the legal right to be in the construction site without the Successor Agency's permission.
3. In the event media representatives arrive near or on the construction site(s), you shall keep them off the site(s), in a courteous and professional manner, until a Public Information Officer is available to meet them at an approved location.
4. You shall report all members of the media visits to the Resident Engineer as quickly as possible, so that the City's Public Information Officer can meet with the members of the media at the construction site(s).
5. If the Successor Agency allows members of the media to access a construction site, you shall allow the Successor Agency to escort the media representatives while they are on the construction site and shall ensure their safety.
6. You shall require media representatives to sign in and out of the Site Visitor Log and to use Personal Protective Equipment.
7. You have a right to speak to members of the media about your company and its role on the project. All other questions shall be referred to the Successor Agency.

7-16.4 **Payment.** The Payment for the Community Outreach Service is included in the various Bid items.

7-20 **ELECTRONIC COMMUNICATION.** ADD the following:

Virtual Project Manager will be used on this contract.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

8-2 **FIELD OFFICE FACILITIES.** To the City Supplement, ADD the following.

The Contractor shall submit to the Owner's Representative the proposed Field Office prior to NTP.

SECTION 9 - MEASUREMENT AND PAYMENT

9-3.2.5 **Withholding of Payment.** To the City Supplement, item i), DELETE in its entirety and SUBSTITUTE with the following:

- i) Your failure to comply with 7-2.3, "PAYROLL RECORDS" and 2-16, "CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM."

ADD:

9-3.7 **Compensation Adjustments for Price Index Fluctuations.** This Contract is not subject to the provisions of The WHITEBOOK for Compensation Adjustments for Price Index Fluctuations for the paving asphalt.

SECTION 200 - ROCK MATERIALS

200-2 UNTREATED BASE MATERIALS.

ADD

200-2.1 General

Base material shall conform to 3/4" crushed aggregate base or 3/4" Class 2 aggregate base, per Caltrans Standard Specifications (current edition). A minimum of 4" Class 2 base shall be used under all sidewalks and driveways in the public right-of-way.

SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE.

201-1.1.2 Concrete specified by class.

ADD the following to table 201-1.1.2 (A):

<u>Item</u>	<u>Concrete Class</u>	<u>Max. Slump (in.)</u>
Concrete (sidewalk, driveways)	560-C-3250	4-inch (Must be certified by truck ticket.)
Concrete Curb	560-C-3250	4-inch
Concrete Street Section	560-C-3250	3-inch

201-1.2 Materials.

ADD:

201-1.2.2 Aggregates

For exposed aggregate concrete, the aggregate shall be 1/4" - 1/2" Arizona River Rock or approved equal. Provide sample to Resident Engineer for approval. Arizona River Rock is available at K.R.C. Rock.

201-1.2.4 ADD mixtures.

ADD:

201-1.2.4 General Requirements.

Admixture for all concrete exposed to view, including gutters, curbs, restraining curbs, and concrete paving (excepting exposed aggregate paving) shall be the following (or equivalent, as approved by the Engineer):

Manufacturer: L.M. Scofield Company
1-800-800-9900

Series: Chromix Integral Color Admixture

Color: C-14 French Gray for Little Italy Paving
White/Light Grey for Corner Paving

Admixture products and procedures for installation shall be in strict accordance with the manufacturer's specifications and recommendations, and those published by the American Concrete Institute (ACI) and the Portland Cement Association (PCA).

201-4 CONCRETE CURING MATERIALS

201-4.1 Membrane Curing Compounds

ADD:

201-4.1.1 General:

Concrete Curing Compounds for all colored concrete curbs, restraining curbs, and concrete paving shall be applied to all exposed surfaces per manufacturer's instructions. Compound shall be a ready-to-use water-based emulsion specifically designed for use as both a color matched curing membrane and sealer designed to cure and protect the colored concrete and accentuate the colors. Compounds shall comply with ASTM C-309, slip resistance ASTM D-2047, and comply with VOC regulations. Compounds shall be the following (or equivalent, as approved by the Engineer):

Manufacturer: L.M. Scofield 1-800-800-9900

Series: Lithochrome Colorwax

Colors: Match integral color admixtures as specified in 201-1.2.4(a).

Concrete curing products and procedures for installation shall be in strict accordance with the manufacturer's specifications and recommendations, and those published by the American Concrete Institute (ACI) and the Portland Cement Association (PCA).

SECTION 202 - MASONRY MATERIALS

ADD:

202-4 INTERLOCKING PAVERS.

202-4.1 Pavers.

Pavers shall be a six (6) inch by twelve (12) inch by eighty (80) mm solid interlocking concrete paver with a minimum compressive strength of 4,500 PSI. Pavers shall be 'Antique Red' color as manufactured by Ackerstone Industries (800) 258-2353, or approved equal laid in a herringbone pattern as shown on the plans. Paver materials shall conform to the following:

202-4.1.1 Paver Materials.

- A. Cementitious Materials: Portland cements shall conform to ASTM Specification C-150.
- B. Aggregates: Aggregates shall conform to ASTM Specification C-33 for Normal Weight Concrete Aggregate (No expanded shale or lightweight aggregates) except that grading requirements shall not necessarily apply.

- C. Other materials: Coloring pigments, air entraining agents, integral water repellents, finely ground silica, etc., shall conform to ASTM Standards where applicable, or shall be previously established as suitable for use in concrete.

202-4.1.2 Paver Physical Properties.

- A. Compressive strength: At the time of delivery to the work site, the average compressive strength shall not be less than 8,000 psi in accordance with ASTM Standard C-140.
- B. Absorption: The average absorption shall not be greater than 5% with no individual unit absorption greater than 7%.
- C. Proven Field Performance: Proven field performance: Satisfying field performance is indicated when paving units similar in composition, and made with the same manufacturing equipment as those to be supplied. Do not exhibit excessive deterioration after at least one (1) year.
- D. All units shall be sound and free of defects that would interfere with the proper placing of unit or impair the strength or permanence of the construction.
- E. Pavers shall conform with ASTM Method C-140.
- F. Pavers shall be free of visible defects, cracks and chipped edges.

202-4.2 Sand Laying Course.

The sand laying course shall be a well-graded, clean, washed sand with 100% passing a 3/8" sieve size and a maximum of 3% passing a No. 200 sieve size. Sand shall be washed concrete sand, limestone screening, or similar. Do not use masonry sand.

202-4.3 Edge Restraint.

All edges of the installed pavers shall be restrained. The type of edge restraint shall conform to details noted on plans. Where not noted, edge restraint can be: cast-in-place concrete curb, concrete sidewalk paving, concrete footing, Minimum 6" wide concrete strip, building edge or foundation, or other suitable permanent methods of preventing the movement of edge pavers as approved by the Resident Engineer.

202-4.4 Sealer.

Paver sealer shall be Stone Tech 'Sure Bond' or approved equal.

SECTION 207 – PIPE

207-9.2.3 Fittings. To the City Supplement, ADD the following:

- 8. Flange gaskets shall be 3.2mm (1/8") thick acrylic or aramid fibers bound with nitrile for all sizes of pipe. Gaskets shall be full-face type with pre-punched holes free of asbestos material. All insulating flange kits require full face gaskets.

207-9.2.6 Polyethylene Encasement for External Corrosion Protection. To the City Supplement, DELETE in its entirety and ADD the following:

When soils have been determined to be mildly corrosive through resistivity testing as specified in the City of San Diego Sewer and Water Design Guides, The outside surfaces of ductile iron pipe and fittings for general use shall be coated with bituminous coating 1 mil (25um) thick in accordance with AWWA C151 or AWWA C110. Polyethylene encasement shall be provided in accordance with AWWA C105.

207-17.2.3 Pipe Manufacturer. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

PVC products as manufactured or distributed by J-M Manufacturing Company shall not be used on the Contract for pressurized pipe **unless specified otherwise**.

207-26.4 Butterfly Valves. To the City Supplement, Paragraph (2), DELETE the last sentence.

To the City Supplement, Paragraph (3,) DELETE in its entirety and SUBSTITUTE with the following:

3. The operator shall be manual with a 2" (50 mm) square operating nut, and shall open the valve when turned counterclockwise.

SECTION 209 – STREET LIGHTING AND TRAFFIC SIGNAL MATERIALS

209-1.2 (86-2.04A) Standards, Steel Pedestrals, and Posts

ADD:

209-1.2.1 Gateway Light Pole

Complete assembly shall be equal to the product as manufactured by Visco, Inc., Antique, Union Metal or approved equal. All manufactures shall have manufactured this exact product for a minimum of three years and shall have this product installed in San Diego county. The contractor shall be responsible for the coordination and assembly of the luminaire and capital assembly and pole from separate manufacturer, including the mounting of the capital on the tenon.

The height of the Gateway light fixture shall be approximately 21 feet measured from the bottom of the base to the center of the light source.

The pole assembly shall be all cast aluminum or steel and supplied in one piece unitized construction. The complete pole assembly shall be composed of the following:

1. Pole Shaft shall be a one-piece, 16-flute, tapered, cast aluminum or steel, 11-gauge pole with base plate welded to pole or heavy wall, copper free cast aluminum or steel. Pole shall be circumferentially welded to base plate. Shaft diameter shall not vary more than two inches from top to bottom. Pole Shaft shall be a minimum of 9".

2. Base Plate shall be of structural grade A36 steel approximately 12 inches square.
3. All anchor bolts shall have an L bend at the bottom, the length of which shall not exceed four times the thickness of the bolt. Each anchor bolt to be supplied with one hex nut for leveling, one hex nut for securing base and two flat washers. The anchor bolt thickness shall be 3/4".
4. Hand hole in pole shaft shall be located below decorative base cover and aligned with base access door with a locking cover. A grounding lug shall be provided inside the hand hole for bonding of equipment ground conductors.
5. Cast Decorative Base shall have overall dimensions of approximately 34 inches high and approximately 24 inches across the octagonal shaped bottom. Base shall be a classic 16-flute cast of aluminum or steel. Cast base to be average minimum wall thickness of .375 inch and shall have an opening for access to hand hole.
6. Grounding shall consist of a copper wire per latest edition of the Standard Specifications for Public Works Construction.
7. The Luminaire Assembly shall consist of the cut-off luminaire, lamp, ballast, and capital Assembly shall be mounted on the tenon on top of the poles. The contractor shall be responsible for coordinating the tenon size of pole and that the Capital housing matches that size. Glass Luminaire shall be 43-7/8" in overall height with a maximum diameter of 17-1/4", mounted atop the pole on Arm Assembly. Luminaire shall be 130 W LED fixture by Holophane Outdoor Architectural Lighting, or GE.
8. All metal parts for all types shall be pretreated prior to coating with a six-stage total immersion system consisting of Washing-Degreasing, Rinse, Phosphate Conversion Coating Rinse, Non-Chromium Sealer, and Rinse.

209-1.2.2

Hanging Basket

All Gateway Poles shall be equipped with two hanging baskets equivalent to those in the Little Italy District.

Hanging planter baskets shall be 22" diameter round with flat steel construction. Baskets will include four strands of small chain sufficient to hang the basket 22"-24" below the hanger bracket, and that are permanently affixed to the basket and hanging hook. The basket and hook shall be texture powder coated black, or, vinyl coated. The basket will include coconut coir liners at least 1/2" thick that completely line and form fit to the inside of the basket. Hanging planter baskets shall be Hooks & Lattice, "22" English Garden Flat Steel Hanging Baskets", or, equal.

The bracket for the hanging planter baskets shall be a double design to hold two baskets. The brackets shall be a two-way scroll design and shall extend 20" from the side of the lamppost.

The hangers shall be designed to attach to the lampposts by a bracket that is part of the hanger, that fits around the existing lamppost and clamps onto it using threaded bolts, nuts and lock washers. Brackets shall not require any drilling or penetration into the lamppost to be securely attached.

Brackets shall be flat steel with a textured powder coated black finish. Bolts, nuts and lock washers shall be galvanized steel with a black anodized finish sufficient in size and strength to support 3 times the weight of the filled and watered baskets. Brackets shall be custom designed and manufactured to fit the lampposts in the Little Italy District.

Lamp Post Bracket for Hanging Planter Baskets shall be Hooks & Lattice, model, "Two-way Scroll Arm Lamp Post Bracket", or, equal.

Reservoir shall have a snug fit in the 22" hanging basket and have a 3 gal. capacity. Reservoir shall be made of PVC or ABS with a PVC or ABS 1 1/2" riser sufficient in height to extend 3" above the rim of the hanging basket while in place.

Hanging basket water well (reservoir) shall be Hooks & Lattice model number ww-100-HB-22, or equal. Hooks & Lattice web site: <http://www.hooksandlattice.com/lamppostbrac.html>

209-1.2.3

Paint

All poles, mast arms, luminaires and appurtenances shall be painted CCDC blue. Contractor shall provide a paint chip for approval prior to material release.

209-6.4

Induction Cobra Head Luminaire. To the City Supplement, CORRECT certain section numbering as follows:

OLD SECTION NUMBER	TITLE	NEW SECTION NUMBER
209-6.4.7	Luminaire Identification	209-6.4.8
209-6.4.8	Photometric Documentation	209-6.4.9
209-6.4.9	Quality Assurance	209-6.4.10

SECTION 212 - LANDSCAPE AND IRRIGATION MATERIALS

DELETE this section in its entirety and refer to Division 32 84 00 and 32 93 10 of the Project Manual.

ADD:

212-3.2.2.3

Trench Marker Tape. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

- a) Trench marker tape shall be 6" wide and consist of a minimum 5.0 mil, five-ply 100% virgin polyethylene which is acid, alkaline and corrosion resistant. Elongation properties and tensile strength of not less than 7,800 psi shall be in

accordance with ASTM D882-80A. The trench marker tape for water lines shall have a minimum 20 gauge solid aluminum foil core, adhered to a 2.55 mil polyethylene backing.

- b) Tape color and legend shall be placed beneath the top protective layer subject to the following:
1. Blue with "Caution Potable Water Line Buried Below" for Water mainlines and over pipe sleeves.
 2. Purple with "Caution Recycled/Reclaimed Water Line Buried Below" for recycled water irrigation mainlines.
 3. Red with "Caution Electric Line Buried Below" for electrical lines servicing the irrigation system, including, but not limited to, 110/220v power to irrigation controllers and pumps, communication cables and irrigation direct burial control wires to remote control valves.
 4. Green with "Caution Sewer Line Buried Below" for Sewer mainlines and over pipe sleeves.

SECTION 213 – ENGINEERING FABRICS

**ADD:
213-3**

VAPOR BARRIER

The waterproofing/vapor barrier system must be composed of materials that can adequately suppress petroleum hydrocarbon and volatile organic compound vapors as demonstrated by testing and analysis via the most recent version of ASTM International (ASTM), originally known as the American Society for Testing and Materials, standard analytical method D-543 for solvent exposure testing (i.e. ASTM D-543-06). Technical specifications for the material selected for use must demonstrate adequate chemical resistance of benzene, toluene, ethylbenzene, total xylenes and other volatile organic compounds at elevated levels and during long term exposure/contact to such chemicals. The specifications for the selected product must be submitted by the Contractor to the Designated Owner's Representative and Environmental Consultant for review, evaluation and approval prior to the use of such material for the project. In the event that the vapor barrier product is deemed unsuitable by the Designated Owner's Representative and Environmental Consultant for the purposes of suppressing petroleum hydrocarbon vapor per ASTM D-543-06, the Contractor shall identify and utilize a suitable replacement product at no additional cost to the Owner. Any replacement product shall be subject to the same evaluation by the Designated Owner's Representative and Environmental Consultant.

ADD:

SECTION 218 - SITE FURNISHINGS

218-1 TREE GRATES.

218-1.1 General.

Tree grates and frames shall be cast iron by the product and manufacturer specified, or equal as approved by the Landscape Architect. Gray iron castings shall conform

to ASTM A-48 Class 35B or better. All castings shall be manufactured true to pattern, and shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion, or other defects, and shall be smooth and well cleaned by shot-blasting.

218-1.2 Tree Grates Manufacturer.

Tree grates, frames and hardware assembly shall be located and furnished as shown on the Contract Drawings. Tree grate assembly shall be the following:

Product: Urban Accessories model Chinook 4 x 6 RCT, four pieces, with standard tree opening, and one-piece steel frame unit, or approved equivalent. This tree grate is referred to as the Little Italy Tree Grate in the CCDC Streetscape Manual and used on Cedar Street. Neenah model R-8811 from the Boulevard Collection, two pieces, with one piece steel frame unit, or approved equivalent. This tree grate is referred to as the Gateway Tree Grate in the CCDC Streetscape Manual and used on Pacific Highway.

Finish: Factory applied finish, consisting of a minimum of one coat primer and one top-coat black enamel. Finish shall be slip-resistant, meeting ADA requirements.

Hardware: Galvanized, anti-pilfer hardware shall be finished to match the color of the tree grate.

218-2 TRASH RECEPTACLES.

Litter receptacle shall be Victor Stanley Ironsites, SD-42, with DS-32 dome top lid or approved equal, with matching liner. Receptacle shall be side door opening, with powder coat finish. Receptacle shall be mounted to sidewalk paving using stainless steel anchor bolts and masonry anchors per the manufacturer's recommendations. Provide stainless steel padlock to secure the door. Submit manufacturer's product data and color for approval. Color shall be "VS-Green" for Little Italy and "RAL 5011 Steel Blue" for Pacific Highway.

Provide direct mounting with four stainless steel masonry anchor bolts and leveling feet.

Manufacturer: Victor Stanley, Inc, phone: 1(800) 368-2573 or approved equal.

SECTION 300 – EARTHWORK

300-1.4 Payment. To the City Supplement, paragraph (2), DELETE in its entirety and SUBSTITUTE with the following:

2. Payment for existing pavement removal and disposal of up to 12" thick, within the excavation e.g., trench limits, shall be included in the Bid item for installation of the mains or the Work item that requires pavement removal.

300-2 CLEARING AND GRUBBING:

**ADD:
300-2.1**

General:

the following:

The existing pavement and base shall be removed to a minimum of 14 inches below finish grade to allow for new paving sections or in locations where the existing asphalt depth is greater than the designated depth, the contractor shall replace the existing depth in order to maintain a direct correspondence between the quantities of removed and replaced asphalt. The contractor shall be aware that existing pavement thicknesses on Pacific Highway are assumed to be 9" AC over 9" PCC and on Cedar Street are assumed to be 9" PCC.

300-2

UNCLASSIFIED EXCAVATION:

**ADD:
300-2.1**

General:

In general, the non-hazardous on-site soils are suitable for reuse as fill if free from vegetation, debris, and other deleterious matter and in conformance with the Property Mitigation Plan (PMP) and section 700 of these specifications

The contractor shall be required to keep the excavation free from excess water. Any water that is encountered during the excavation, including rain water, shall become the responsibility of the contractor and shall be stored, tested, and properly disposed of in accordance with the standard specifications, these special provisions and all applicable City, State, and Federal regulations. No separate payment shall be allowed.

SECTION 302 – ROADWAY SURFACING

302-3

PREPARATORY REPAIR WORK. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

302-3

PREPARATORY REPAIR WORK.

1. Prior to roadway resurfacing or the application of slurry, the Contractor shall complete all necessary preparation and repair work to the road segment e.g., tree trimming, weed spray, weed abatement, crack sealing, asphalt repair, hump removal, miscellaneous asphalt patching, removal of raised pavement markers, removal of pavement markings, etc. and as specified in the Special Provisions.
2. Preparatory work shall include, but not be limited to, tree trimming, weed spray, weed abatement, crack sealing, asphalt repair i.e., mill and pave, hump removal, miscellaneous asphalt patching, removal of raised pavement markers, removal of pavement markings, etc.
3. The Contractor shall repair areas of distressed asphalt concrete pavement by milling or removing damaged areas of pavement to a minimum depth of 2" for Residential streets, and a minimum depth of 3" for all others to expose firm and unyielding pavement. The Contractor shall prepare subgrade as needed and install a minimum of 2" for residential streets, and a minimum of 3" for all others, of compacted asphalt concrete pavement over compacted native material as directed by the Engineer.

4. If, in order to achieve the minimum specified depth, the base material is exposed, the material shall be compacted to 95% relative compaction to a depth 10" below the finished grade (dig out). Compaction tests shall be made to ensure compliance with the specifications. The Engineer will determine when and where the test will occur. The City will pay for the soils testing required by the Engineer, which meets the required compaction. The Contractor shall reimburse the City for the cost of retesting failing compaction tests. If additional base material is required, the Contractor shall use Class 2 Aggregate Base in accordance with 200-2.2, "Crushed Aggregate Base."
5. Recycled base material shall conform to Crushed Miscellaneous Base Material in accordance with 200-2.4, "Crushed Miscellaneous Aggregate Base."
6. Prior to replacing asphalt, the area shall be cleaned by removing all loose and damaged material, moisture, dirt, and other foreign matter and shall be tack coated in accordance with 302-5.4 "Tack Coat."
7. The Contractor shall install new asphalt within the repair area or for patches in accordance with 302-5, "ASPHALT CONCRETE PAVEMENT." Asphalt concrete shall be C2-PG 64-10 in compliance with 400-4, "ASPHALT CONCRETE."
8. No preparatory asphalt work shall be done when the atmospheric temperature is below 50 °F or during unsuitable weather.
9. Following the asphalt placement, the Contractor shall roll the entire area of new asphalt in both directions at least twice. The finished patch shall be level and smooth in compliance with 302-5.6.2 "Density and Smoothness." After placement and compaction of the asphalt patch, the Contractor shall seal all finished edges with a 4" wide continuous band of SS-1H.
10. The minimum dimension for each individual repair shall be 4' x 4' and shall be subject to the following conditions:
 - a) If the base material is exposed to achieve the required minimum removal thickness, the base material shall be prepared conforming to 301-1, "SUBGRADE PREPARATION."
 - b) When additional base material is required, then the contractor shall use Class 2 Aggregate Base in accordance with 200-2.2, "Crushed Aggregate Base." Recycled base material shall conform to Crushed Miscellaneous Base Material in accordance with 200-2.4, "Crushed Miscellaneous Base."
 - c) The Contractor may use grinding as a method for removal of deteriorated pavement when the areas indicated for removal are large enough (a minimum of the machine drum width) and when approved by the Engineer.
 - d) For both scheduled and unscheduled base repairs, failed areas may be removed by milling or by excavation provided that the edges are cut

cleanly with a saw. The areas shall be cleaned and tack coated in accordance with 302-5.4, "Tack Coat" before replacing the asphalt. The areas for scheduled repairs have been marked on the street.

302-3.1 Asphalt Patching.

1. Asphalt patching shall consist of patching potholes, gutter-line erosion, and other low spots in the pavement that are deeper than ½" per 302-5.6.2, "Density and Smoothness." These areas are generally smaller and more isolated than those areas in need of mill and pave.
2. The areas requiring patching have been identified in the Contract Documents, marked on the streets, or as directed by the Engineer. The Contractor shall identify any new areas that may require patching prior to slurry work to ensure the smoothness and quality of the finished product.
3. The Contractor shall identify and repair any areas that may require patching, prior to the placement of slurry seal for smooth finished product.
4. Asphalt overlay shall not be applied over deteriorated pavement. Preparatory asphalt work shall be completed and approved by the Engineer before proceeding with asphalt overlay.
5. The Contractor shall remove distressed asphalt pavement either by saw cutting or milling, to expose firm and unyielding pavement; prepare subgrade (as needed); and install compacted asphalt concrete pavement over compacted native material as directed by the Engineer.
6. Prior to replacing asphalt, the area shall be cleaned and tack coated per 302-5.4, "Tack Coat".
7. Following the asphalt placement, the Contractor shall roll the entire patch in both directions covering the patch at least twice.
8. After placement and compaction of the asphalt patch, the Contractor shall seal all finished edges with a 4" wide continuous band of SS-1H.
9. Base repairs shall not exceed 20% RAP in content.

302-3.2 Payment.

1. Payment for replacement of existing pavement when required shall be included in the unit bid price for Asphalt Pavement repair for the total area replaced and no additional payment shall be made regardless of the number of replacements completed. No payment shall be made for areas of over excavation or outside trench areas in utility works unless previously approved by the Engineer. No payment for pavement replacement will be made when the damage is due to the Contractor's failure to protect existing improvements. The Contractor shall reimburse the City for the cost of retesting all failing compaction tests.

2. The areas and quantities shown on the road segments and in appendices are given only for the Contractor's aid in planning the Work and preparing Bids. The Engineer will designate the limits to be removed and these designated areas shall be considered to take precedent over the area shown in an Appendix to the Contract Documents. The quantities shown in the appendices are based on a street assessment survey and may vary.
3. At the end of each day, the Contractor shall submit to the Engineer an itemized list of the asphalt pavement repair work completed. The list shall include the location of the work and the exact square footage of the repair.
4. Preparatory repair work and tack coating will be paid at the Contract unit price per ton for Asphalt Pavement Repair. No payment shall be made for areas of over excavation unless previously approved by the Engineer.
5. Milling shall be included in the Bid item for Asphalt Pavement Repair unless separate Bid item has been provided.
6. Payment for miscellaneous asphalt patching shall be included in the Contract unit price for slurry and no additional payment shall be made therefore.

302-5.1.1 Damaged AC Pavement Replacement. To the City Supplement, DELETE in its entirety.

302-5.1.2 Measurement and Payment. To the City Supplement, DELETE in its entirety.

302-5.2.1 Measurement and Payment. To the City Supplement, item c), ADD the following:
Imported Subgrade material shall be paid per bid item "Imported Backfill".

302-6 PORTLAND CEMENT CONCRETE PAVEMENT

ADD:

302-6.4.5 Finishes of Concrete.

Unless otherwise noted, all concrete surfaces shall be given a light broom finish with lines running perpendicular to the work or paving edge. Color hardener shall match color and manufacturer of integral color. Concrete surfaces to receive exposed aggregate finish shall be finished per section 303-5.5.3.

Sandblasted finish curbs shall be blasted uniformly to partially expose the concrete aggregate and roughen the surface to achieve a stone-like appearance. Provide a sample for approval by Resident Engineer.

SECTION 303 CONCRETE AND MASONRY CONSTRUCTION

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS

303-5.5.3 Sidewalk:

ADD:

303-5.5.3.1 Exposed Aggregate Finish Concrete:

The concrete for exposed aggregate walkways shall be delivered to the site premixed with the concrete color admixture in conformance with the instructions of the admixture manufacturer.

Following placement of concrete, the aggregate shall be seeded over the wet concrete surface evenly to completely cover the surface. Lightly screed the surface to smooth and set the aggregate. Do not overwork or cause the aggregate to settle below the surface of the concrete. Following floating, edging and jointing, retardant shall be applied by spraying per manufacturer's instructions.

Cover the concrete with plastic sheeting. Allow to cure for approximately 12 hours before removing the sheeting and exposing the aggregate. Aggregate shall be exposed by washing with clean water to remove cement between the aggregate in a uniform manner, exposing the aggregate and sand. A broom may be used to assist in the removal of the concrete to a depth of approximately 1/16 inch. Remove residue, deposits and clean the finished surface.

Following the curing of the concrete, the exposed surface shall be acid washed lightly to enhance the crispness of the appearance. Do not permit the acid to penetrate the soil or contact plant material.

This surface should exhibit a uniform density of aggregate on the surface. The matrix color should be visible as an undertone. Submit a minimum 2 by 2 foot sample of the finished color and texture for approval by the Resident Engineer a minimum of 30 days prior to constructing concrete. Samples shall be remade until an acceptable finish is produced as judged by Resident Engineer. Sample shall be the standard for acceptability of finished work.

**ADD:
303-9**

CONCRETE INTERLOCKING PAVERS.

303-9.1

General.

303-9.1.1

Scope of Work.

The work includes all services, labor, materials, transportation and equipment necessary to: furnish and place sand laying course; furnish and install interlocking concrete pavers in the quality, shape, thickness and color as specified; and furnish and install all accessory items as shown on the drawings and as specified in these Special Provisions.

303-9.1.2

References.

- A. ASTM C936 - "Standard Specification for Solid Concrete Interlocking Paving Units".
- B. NCMA-TEK, TEK 87 - "Construction of Concrete Masonry Pavements".

303-9.1.3

Submittals.

- A. Manufacturer's product data.
- B. Documentation of installer's experience.
- C. Manufacturer's installation instructions.
- D. Three pavers of each color to illustrate the color lots available for the project.

303-9.1.4 Quality Assurance.

- A. Manufacturer: Company specializing in the manufacturing of solid concrete interlocking pavers for a period of 5 years; single-layer production only; multi-layer production is unacceptable.
- B. Installer: Company specializing in the installation of solid concrete interlocking pavers with 3 years experience (and accredited by the manufacturer in relation to the paver type and project requirements).

303-9.1.5 Mock-ups.

Provide 4' x 4' mock-up of each pattern/color of pavers with normal color variations.

303-9.1.6 Delivery, Storage and Handling.

Deliver pavers in such a manner that no damage occurs during shipping, handling, unloading and storage.

303-9.1.7 Project Conditions.

Install pavers only under conditions stipulated in manufacturer's instructions.

303-9.1.8 Sequencing and Scheduling.

Coordinate installation of pavers with work specified in these special provisions, the technical specifications, and the standard specifications.

303-9.1.9 Warranty.

- A. Installation - Installer shall provide a one (1) year written guarantee.
- B. Pavers - Manufacturer shall provide a one (1) year written guarantee.

303-9.2 Paver Installation.

303-9.2.1 Preparation.

- A. A suitable base shall be prepared as indicated on the plans and specified in related sections of this specification.
- B. The base course shall be shaped to grade and cross section with an allowable tolerance of 1/4" (5 mm) (relative to specified dimensions below finish design elevation).

303-9.2.2 Sand Laying Course.

- A. Contractor shall inspect and approve the finished base course prior to placement of the sand laying course.
- B. Spread the sand evenly over the area to be paved.
- C. Screed the sand to a level that will produce a 1" (25 mm) thickness when the paving stones have been placed and vibrated.

- D. In addition, provide the proper level of sand such that the final elevation of paving stones will be nominally 1/8" higher than the adjacent curb, gutters, other paving, etc., to allow for free drainage from chamfers on block edges (unless otherwise noted on plans.)
- E. Do not disturb the sand laying course once screeding and leveling to the desired elevation is achieved.

303-9.2.3 Color Layout

- A. The colors in each field shall be randomly mixed to avoid concentration of darker or lighter pavers in any one area.

303-9.2.4 Placement.

- A. The pavers shall be placed in the approved pattern as noted or shown on the drawings. Pavers shall be cut to accommodate patterns. The Contractor shall notify the Engineer a minimum of 48 hours in advance to field verify the layout of paving patterns prior to installation.
- B. The pavers shall be placed in such a manner that the desired pattern is maintained and the joints between the pavers are nominally 1/8" with no individual gap exceeding 1/4".
- C. Use string lines to hold all patterns true.
- D. The gaps at the edge of the paver surface shall be filled with standard pavers or with pavers cut to fit.
- E. The cutting of pavers, using a double-headed breaker or a masonry saw, shall leave a clean edge to the traffic surface.
- F. When cutting precision designed areas, a masonry saw shall be used. Cut pieces shall fit accurately, and not result in spaces between pavers any larger than that between uncut pavers.
- G. Pavers to be alternately selected from at least three (3) pallets, working from top to bottom in each pallet stack.
- H. Pavers shall be vibrated into the sand laying course using a vibrator capable of 3,000 to 5,000 pounds compaction force with the surface clean and the joints open.
- I. After vibration, clean masonry type sand containing at least 30% of 1/8" (3 mm) particles shall be spread over the paving surface, allowed to dry, and vibrated into the joints with additional vibrator passes and brushing so as to completely fill the joints.

- J. Surplus material shall be swept from the surface, (or left on the surface during construction to promote complete filling of the joints during initial use. This sand may also provide surface protection from construction debris.)
- K. Pavers shall be firmly set, and free of movement. Pavers shall be flush with the adjacent paver, and with adjacent pavement.
- L. Pavers shall be sealed with the specified sealer per manufacturer's specifications and in accordance with manufacturer's application coverage rates.
- M. Upon completion of work covered in this section, the Contractor shall clean up all work areas by removing all debris, surplus material and equipment from the site.
- N. Any settling or displacing of pavers shall be replaced and re-compacted to provide an even installation.

SECTION 305 – PILE DRIVING AND TIMBER CONSTRUCTION

**ADD:
305-3**

SAFETY

Contaminated, potentially contaminated, and/or hazardous substances will be encountered in the excavation and spoils from the shoring installation. In accordance with section 703, the contractor shall prepare a Health and Safety Plan (HSP) for this work.

The Contractor shall ensure that all workers who will or are likely to come in contact with contaminated substances or other potential chemical and physical occupational hazards are properly trained, with appropriate and current certifications, and are experienced in these types of situations as described in the Property Mitigation Plans (PMP) and as required by all applicable statutes, regulations, and regulatory agency requirements. The Contractor shall be responsible for worker health and safety, including medical monitoring, in accordance with the HSP, and as required by all applicable statutes, regulations, and regulatory agency requirements. The HSP shall be reviewed and understood by sub-contractors and others, as appropriate, prior to initiation of construction activities.

All contractor's personnel responsible for and involved in the shoring excavation will be thoroughly knowledgeable and experienced in the various aspects of the work to be completed. This knowledge and experience will include, but not be limited to, familiarity with the Site geologic and hydrogeologic conditions, laboratory data review and verification, Site physical conditions and access, Site personnel and contacts and Site health and safety rules, procedures, and protocols. Field personnel will have 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and current 8-hour annual refresher training in accordance with 29 Code of Federal Regulations 1910.120 [Title 8 California Code of Regulations 5192]. Site field work will also be conducted in accordance with a Site-specific, worker health and safety plan. In addition, contractor's employees who will be in contact with contaminated soil will have the proper 40-hour HAZWOPER training.

The Contractor shall conduct on-site health and safety meetings according to the HSP. The Contractor shall keep a log documenting worker attendance at health and safety meetings. The log also shall include written confirmation, signed and dated by the Contractor's Site Safety Manager and each worker, as appropriate, indicating that the Contractor's Site Safety Manager has briefed all workers, and that each worker has read and understands the HSP, and agrees to abide by its provisions. The Contractor shall maintain a copy of the log on site at all times and, with reasonable notice, make the log available for review by the owner's environmental consultant.

SECTION 306 – UNDERGROUND CONDUIT CONSTRUCTION

306-1

OPEN TRENCH OPERATIONS. To the City Supplement, CORRECT certain section numbering as follows:

OLD SECTION NUMBER	TITLE	NEW SECTION NUMBER
306-1.8	House Connection Sewer (Laterals) and Cleanouts	306-1.9
306-1.7.1	Payment	306-1.9.1
306-1.7.2	Sewer Lateral with Private Replumbing	306-1.9.2
306-1.7.2.1	Location	306-1.9.2.1
306-1.7.2.2	Permits	306-1.9.2.2
306-1.7.2.3	Submittals	306-1.9.2.3
306-1.7.2.4	Trenchless Construction	306-1.9.2.4
306-1.7.2.5	Payment	306-1.9.2.5
306-1.7.3.6	Private Pump Installation	306-1.9.2.6
306-1.7.3.7	Payment	306-1.9.2.7

SECTION 308 – LANDSCAPE AND IRRIGATION INSTALLATION

DELETE this section in its entirety and refer to Division 32 84 00 and 32 93 10 of the Project Manual

ADD:

SECTION 312 - SITE FURNISHINGS INSTALLATION

312-1 GENERAL INSTALLATION REQUIREMENTS:

1. Install all factory-fabricated landscape furnishings per manufacturer's specifications and recommendations. All components shall be firmly and permanently affixed to concrete base or footings to the satisfaction of the Resident Engineer and in conformance with the manufacturer's instructions. Installed furnishings shall be stable and in an upright position. Anchor bolts cast into the concrete shall reinforce all attachments. Tamper-resistant connectors shall be used to prevent theft.
2. See construction plans and details for location and layout and model numbers of furnishings.
3. Apply anti-graffiti coating as required prior to installation, and after the appropriate curing time for all materials to avoid discoloration.
4. Clean-up: The site shall be kept clean and free of tools, trash, debris and installation materials on a daily basis. Material may be stored on-site during installation with appropriate protective measures and approval by the resident engineer.
5. Close out: contractor shall provide the owner with one copy of complete manufacturers installation instructions and maintenance kit.

312-2 LITTER RECEPTACLES

The Contractor shall submit the manufacturer's product data (including finish data) and installation specifications and other data required to demonstrate compliance with the specified item.

Deliver, store, and handle landscape furnishings to prevent damage and deterioration.

Do not install receptacles before completion of final grading, and concrete paving.

Examine subgrades, finished surfaces, and installation conditions. Do not start landscape accessories work until unsatisfactory conditions are corrected.

Remove loose material and debris from base surface before placing landscape furnishings.

Locate and layout all landscape accessory items. Obtain Engineer's acceptance of layout prior to installation.

Install all litter receptacles landscape furnishings per manufacturer's specifications and/or recommendations. Anchor securely to grade using stainless steel dowels and epoxy grout pocket appropriate for the installation.

Litter Receptacles shall be set in place as indicated on the plans and as approved by the Engineer. Receptacles shall be fabricated, cut or ground to fit grade to provide a level installation. Installed receptacle shall be true and square to paving design, installed level and shall not wobble.

Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from landscape furnishings work.

Protect litter receptacles from damage during construction.

SECTION 703 – ENCOUNTERING OR RELEASING HAZARDOUS SUBSTANCES.

To the City Supplement, **DELETE** in its entirety and **SUBSTITUTE** with the following:

SECTION 703 – ENCOUNTERING OR RELEASING HAZARDOUS SUBSTANCES

703-1 HAZARDOUS BUILDING MATERIALS ABATEMENT

703-1.1 General

703-1.1.1 Description Of Work

This section covers the furnishing of labor, materials, facilities, equipment, services, employee training, permits, agreements, waste transport and disposal necessary to perform the work required for hazardous materials removal (specifically asbestos) in accordance with these specifications, U.S. Environmental Protection Agency (EPA), San Diego Air Pollution Control District (APCD), U.S. Department of Labor Occupational Safety and Health Administration (OSHA), Department of Health Services (DHS), National Institute for Occupational Safety and Health (NIOSH), State of California regulations, and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references, the most stringent provisions are applicable. An Asbestos and Lead-Based Paint survey dated December 29, 2010 has been completed at the proposed Fire Station No. 2 (Bayside) and should be reviewed in conjunction with this specification.

A. The abatement Contractor shall perform the work and provide the services listed below:

Asbestos Containing Materials Removal		
Material	Location of Material	Quantity Estimate
Black Vinyl Floor Tile/Mastic (Floor Tile 3% Chrysotile – Mastic Non-Detected)	Throughout Second Floor (Underlying Layer)	~180 square feet
Vinyl Sheet Flooring Mastic (Trace Anthophyllite)	Second Floor Restroom	~50 square feet
Baseboard and Mastic (Trace Anthophyllite)	Throughout Second Floor	~60 square feet
Exterior Stucco (Trace Chrysotile)	Throughout Exterior	~2,500 square feet
Roof Penetration Mastic (5% Chrysotile)	Throughout Roof	~100 square feet
Lead-Based Paint Removal		
Material	Location of Material	Quantity Estimate
Red, White and Blue Ceramic Tile (Intact Condition)	Throughout Interior	~1,300 square feet

Removal, transportation and disposal of all universal waste at the subject property, including but not limited to light ballasts, thermostats, fluorescent light tubes and any other applicable materials. If sampling and analysis for disposal/recycling of the universal waste is required, it will be the responsibility of the Contractor.

It is also noted that lead was detected in numerous other painted surfaces within the subject structures but not at concentrations that would result in such surfaces to be considered lead-based paint. Regardless, The California Occupational Safety and Health Commission (CAL-OSHA) requires that all workers be properly protected when working with materials containing any level of lead in accordance with Title 8 CCR Section 1532.1. This requirement will apply to the selected Contractor who will complete the demolition work at the property.

Please note that it is **the responsibility of the Contractor to walk the site prior to bid submission and/or commencing work and verify estimated quantities and types of asbestos-containing materials, lead-based paint, universal waste or any other hazardous materials involved in the work. The Contractor shall be responsible for determining exact material quantifications for bidding/billing purposes and shall verify these quantities and the location of all work to be performed.** Failure to do so shall not relieve the Contractor of the obligation to furnish all materials and labor necessary to carry out the provisions of the Contract. If in doubt, an unassessed material shall be assumed as asbestos containing or hazardous unless tested by the Contractor or Owner's Representative. No additional payment for abatement/removal of increased quantities of asbestos and lead containing materials in addition to universal waste above those as noted in this specification will be paid to the contractor.

Final payment for the hazardous materials abatement shall not be approved until a copy of all waste manifests, certificates of disposal, or other certified records is delivered to the Owner. Payment for the hazardous materials abatement that is required of the Contractor per the standard specifications and these special specifications shall be per as specified in the bid documents and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for completing all work involved in the abatement work, including all associated costs and fees as defined in these specifications. In addition, no separate measurement or payment will be made for additional items or work considered incidental to the conduct of the Base Contract Bid Price.

703-1.1.2 Project Schedule

The Contractor shall start and complete work on the following dates, as defined by the Owner:

START DATE: TBD
COMPLETION DATE: TBD

703-1.1.3 Authority To Stop Work

The Environmental Consultant, acting as an agent for the Owner, has the authority to stop the abatement work any time it determines that conditions are not within the specifications and applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of the Environmental Consultant. Standby time required to resolve violations shall be at the Contractor's expense. Stop Work Orders may be issued for, but shall not be limited to the following:

- Excessive asbestos airborne fibers inside and outside work area.
- Breaks in barriers.
- If applicable, loss of negative air (0.02 inches of water-minimum negative pressure to be maintained)
- Any other situation (outside the work area) where the Environmental Consultant establishes that the following limits have been exceeded:

Asbestos Non-Work Area Limits: 0.1 f/cc Personal Exposure Limit (PEL)

8-hour TWA PEL - 0.1 f/cc,

(When the PEL is reached, stop work and cleanup procedures shall be initiated to reduce asbestos levels to below 0.1 f/cc in non-work areas. This PEL would happen in the event of contamination from the work area.)

703-1.1.4 Job Supervision

- A. The Contractor shall provide an on-site Supervisor and at least one Foreman for each work area while removal work is in progress. The Supervisor and Foreman should be competent persons as defined by 29 CFR 1926.58 and must be experienced in asbestos/lead removal work, knowledgeable of all EPA, APCD, OSHA, DHS and local regulations. They shall be capable of skillfully executing all work promptly, efficiently and in compliance with all of the requirements within this specification.
- B. Proof of qualifications and asbestos/lead removal job references may be required at the discretion of the Owner for both the Supervisor and Foreman.
- C. The Owner or Environmental Consultant reserve the right to have any supervisory personnel removed if they do not demonstrate the requisite experience and/or skills to safely direct the work, and adequately protect their employees, and the Owner.
- D. The Contractor shall instruct, train, and provide required protective devices, to all workers of other trades who must enter any work area before it is certified clean. The instruction shall include, proper use and fitting of respiratory protective devices and protective clothing, entry and exit procedures for all work areas, hazards and asbestos/lead exposure, work procedures, and other safety requirements contained in the specification. Proof of such instructions for all Subcontractor workers, and workers of other trades employed by the Contractor, shall be supplied prior to being allowed into the work area.

703-1.1.5 Pre-Construction Meeting

After the contract has been executed and submission of the submittal required in Section 1.20, a Pre-Construction Meeting to be attended by the Designated Owner's Representative, the Environmental Consultant and the Contractor will be conducted. At this conference, the Contractor shall identify his Supervisor(s) and Foreman(s).

- A. The parties shall also discuss and reach agreement on the following items:
 - Contractor listing of existing site conditions (i.e., damage).
 - Coordinate Contractor access routes to the work area, including approved doors, stairways, corridors, and elevators.
 - Availability of building utility services such as power, water supplies, and drains.
 - Determination of equipment and other movable items to be removed from the work area by the Contractor, and the location of temporary storage space.

- Location, coverage, and use of isolation barriers and Decontamination Facilities.
- Emergency response procedures.
- Other items pertinent to the project.

703-1.1.6 Availability Of Trained Personnel

There shall be a sufficient number of trained and qualified workers, foremen and superintendents to accomplish the work within the required schedule. Demolition activities cannot start prior to the successful decontamination of the work area, it is imperative that a sufficient number of trained personnel be engaged throughout the abatement process. No untrained or unqualified person shall be employed to speed up completion of the abatement work.

703-1.1.7 Notifications, Permits, Warning Signs, Labels, And Posters

- A. The Contractor shall provide the required written pre-notification to EPA, DHS, APCD, CAL/OSHA, and any other regional, state or local authority having jurisdiction over the project. Copies of the pre-notifications shall be delivered to the Environmental Consultant and Designated Owner's Representative before any removal work begins. The Contractor must secure all other permits required for the work; including disposal of all asbestos/lead containing waste and universal waste in an approved landfill.
- B. The Contractor shall provide the necessary follow-up notices that may be required, obtain all permits and pay all governmental taxes, fees and all other costs in connection with his work. He shall file all necessary plans, prepare all documents and obtain all necessary approvals of any governmental departments having jurisdiction.
- C. The Contractor shall include in the work all labor, materials and service apparatus, to comply with all applicable laws, ordinances, rules and regulations.
- D. All materials and work shall comply with all applicable specifications of the NBFU, FM, NEC, UL, local utility companies and applicable health agencies, with recommendation of the fire insurance rating organization having over riding jurisdiction, with state and national building codes, and contract requirement in excess of the applicable codes, rules, or regulations, the contract provisions shall be given precedence, unless special permission is granted by the Environmental Consultant.
- E. The Contractor shall comply with the requirement of the following regulations, and maintain a copy of each of these at the work site:
 - 1. U.S. Department of Labor, OSHA Asbestos Regulations (29 CFR 1926.58) 28 CFR 1910.134(b).
 - 2. U.S. EPA National Emission Standard for Asbestos (40 CFR 61, Subpart M)
 - 3. San Diego Air Pollution Control District (SDAPCD Rule 361.145)

4. NESHAPS Labeling Requirements
 5. Title17, California Code of Regulations, Division 1, Chapter 8
 6. CAL/OSHA Lead in Construction Standard
- F. The Contractor shall erect OSHA-specified warning signs around the workspace and at every point of potential entry from the outside including the entrance to the Decontamination Facility's Clean Room. The signs shall conform to OSHA requirements with the words "Danger, Asbestos Hazard, Do Not Enter" or "Danger Lead Hazard Do Not Enter" as applicable. The warnings signs shall be a bright color so that they can be easily noticed. The size of the sign and its lettering shall be no less than OSHA requirements.
- G. The Contractor shall also provide EPA and DOT-required labels as well as NESHAPS labeling requirements for all plastic bags and drums utilized to transport asbestos/lead contaminated material from the work areas to the EPA approved disposal landfill.
- H. Provide any other signage, labels, warnings and posted instructions that are necessary to protect, inform and warn workers and visitors of the hazard from asbestos/lead exposure. The Contractor shall post in a prominent and convenient place (i.e. the Clean Room of the Decontamination Facility) for worker's use a copy of the latest applicable regulations of OSHA, DHS, EPA, and NIOSH; and a copy of these specifications.

703-1.1.8 Protection Of Person And Property

- A. General Safety Requirements
1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with his work. The Contractor shall take all reasonable precautions for the safety of and shall provide all reasonable protection to prevent damage, injury or loss to all his employees and other persons who may be affected thereby. He shall also be responsible to protect all work, materials and equipment to be incorporated therein, and other property at the Project Site and adjacent thereto. The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and orders of any public authority bearing on the safety of persons and property and there protection from damage, injury or loss. The Contractor shall promptly remedy all damage or loss to any property caused in whole or in part by the Contractor, Sub-Contractor, Sub-Subcontractor, or anyone directly or indirectly employed by them, or by anyone for whose acts they may be liable, and not attributable to the fault or negligence of the Contractor. The Contractor shall be responsible for the protection of any finished work from damage or defacement by his operation.
 2. Life Safety Systems: The Contractor shall assess and control the real or potential impact of his actions upon the Owner's life safety systems (e.g.,

smoke detectors, sprinkler systems, etc.). Coordination between the Contractor and the Designated Owner's Representative must be established prior to any actions on the part of the Contractor. Any work plan is subject to modification by the Owner at anytime based on the Designated Owner's Representative's assessment of risks to the function of the life safety systems associated with the Contractor's actions.

- B. The Contractor shall establish an effective safety program in accordance with the requirements set forth in OSHA Part 1926- Safety and Health Regulations for Construction; Subparts A through Z.
- C. A "Pre-construction Safety Conference" shall be held prior to any work at the convenience of the Owner and the Designated Owner's Representative. The purpose of this meeting will be to discuss and evaluate the Contractor's proposed safety program.

703-1.1.9

Electrical

A. Safety Requirements:

- 1. All electrical work shall be performed by a licensed electrician in compliance with the most recent edition of the National Electric Code, unless otherwise provided by applicable OSHA regulations.
- 2. The non-current carrying-metal parts of fixed, portable and plug-connected equipment shall be grounded. Portable tools and appliances are to be protected by an approved system of double insulation need not be grounded. All light and power circuits in asbestos removal areas shall be ground fault protected.
- 3. Extension cords shall be the 3-wire type, shall be protected from damage, and shall not be fastened with staples, hung from nails, or suspended from wire; splices shall have soldered wire connections with insulation equal to the cable. Worn or frayed cords shall not be used.
- 4. Safe lighting equipment shall be provided with a preference for floodlights rather than the indiscriminate use of unprotected lamps strung on temporary wiring. Exposed bulbs shall be guarded to prevent accidental contact. Temporary wiring shall be properly insulated and substantially supported. Circuits shall be properly designed and fused. All temporary lighting inside of the asbestos/lead removal areas shall be waterproofed.
- 5. Receptacles for attachment plugs shall be approved, concealed contact type. Where different voltages, frequencies, or types of current are supplied, receptacles shall be of such design that attachment plugs are not interchangeable.
- 6. Each disconnecting means for motors and appliances and each service feeder or branch circuit at the point where it originates shall be legibly marked to indicate its purpose.

7. The Contractor shall coordinate all power requirements including Ground Fault Interrupted (GFI) panel design and extension cord requirements, with the Designated Owner's Representative.

703-1.1.10 Site Security

- A. Requirements: Security for the project shall be coordinated with the Designated Owner's Representative.

703-1.1.11 Scaffolding, Rigging And Hoisting

- A. Unless otherwise specified, the Contractor shall provide all scaffolding, rigging, hoisting, and services necessary for accomplishing the removal. The Contractor shall remove all equipment from the premises when the equipment is no longer required.

703-1.1.12 Emergency Precautions

- A. Emergency planning and procedures shall be developed by the Contractor prior to any abatement initiation.
- B. Emergency procedures shall be in written form and prominently posted. The Contractor shall ensure that all persons entering the work area read these procedures and understand the project site layout, location of emergency exits and emergency procedures.
- C. Emergency planning shall include consideration of fire, explosion, electrical hazards, slips, trips and falls, confined spaces, and heat related injury. Written procedures shall be developed and the Contractor shall provide employee training in all related procedures.
- D. Employees shall be trained in evacuation procedures in the event of work place emergencies.
 1. For non-life-threatening situations, employees who are injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from a fellow worker (if necessary) before exiting the work place to obtain proper medical treatment.
 2. For life-threatening injury or illness, worker decontamination shall take least priority. After measures to stabilize the injured worker are completed remove him from the work area and secure proper medical treatment.
 - a. Telephone numbers of all emergency response personnel shall be prominently posted in the clean room and equipment rooms.

703-1.1.13 Fire Protection

- A. All plastic, spray-on strippable coatings and structural materials used in the asbestos/lead abatement process shall be UL approved and certified as fire retardant or noncombustible.

- B. Wood shall be pressure impregnable and certified as fire retardant.
- C. Material Safety Data Sheets (MSDS) for fire retardant materials shall be made available upon request.
- D. All combustible rubbish and debris, including properly bagged asbestos/lead waste shall be properly disposed of at the end of each working day.
- E. A minimum of one (1) 4A/60BC dry-chemical extinguisher shall be maintained at each of the following locations:
 - 1. At each corner of the work area. Where no clear corners exist, four (4) extinguishers shall be placed around the exterior wall of the work area so that they are approximately 25 percent of the total distance apart.
 - a. Exception: Where the total abatement containment area is less than 1,000 square feet, two (2) 4A/60BC extinguishers shall be provided. All extinguishers shall be clearly identified with red tape.
 - 2. The Contractor shall ensure that all on-site personnel are aware of the locations and are properly trained in the use of all extinguishers and other fire/life safety equipment.
- F. All existing fire detection, alarm systems, connections and sand pipes shall remain in place, active and unobstructed. The Environmental Consultant must approve any alteration to any equipment in writing.

703-1.1.14 Respiratory Protection

- A. The Contractor shall provide all workers, foremen, superintendents, authorized visitors, and inspectors personally issued and marked respiratory protective equipment approved by NIOSH and MSHA. When respirators with disposable filters are employed, the Contractor shall provide sufficient filters for replacement as necessary for the workers or authorized visitors. All used filters shall be disposed of as contaminated waste.
- B. The Contractor shall instruct and train each worker involved in asbestos/lead abatement or maintenance and repair of asbestos/lead-containing materials, in proper respiratory use. The Contractor shall require that each worker always wear a respirator properly fitted in the work area from the start of any operation, which may cause any airborne asbestos fibers/lead dust until the work area is completely decontaminated. The Contractor shall use respiratory protection appropriate for the fiber/dust levels encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.
- C. PAPR's shall be used as long as 0.5 f/cc or 40 mg/cc is not exceeded within the work area. If exceeded, all removal work inside work area shall stop and corrective actions (cleaning) will be required until fiber levels are reduced to less than 0.5 f/cc or 40 mg/cc.

- D. Unless otherwise permitted, respiratory protection as specified herein shall be worn at all times, including preparation of the work areas, loading and unloading of waste containers in the work area or at the transport truck, and cleaning of the work area.
- E. Facial hairs such as beards, sideburns and mustaches which interfere with the seal of air purifying type respirators are prohibited. Workers with eye glasses shall not be permitted to work.
- F. Respiratory protection maintenance and decontamination procedures shall meet the following requirements:
 - 1. Respirators shall be inspected and decontaminated on a daily shift basis in accordance with OSHA 29 CFR 1910.124(b).
 - 2. Respirators shall be the last piece of protection equipment to be removed.
 - 3. Airline respirators with HEPA-filtered disconnects shall be disconnected in the equipment room. Filter/power pack assemblies shall be decontaminated in accordance with manufacturer's recommendations.
 - 4. Respirators shall be stored in a dry place in such a manner that the face piece and exhalation valves will not be distorted.
 - 5. Organic solvents shall not be used for the washing of respirators. Whenever respirator design permits, workers shall perform a positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate air flow (using the method specified by the manufacturer) every four (4) hours of use and each time the worker enter or exits the removal area. Written logs of these tests shall be maintained by the Contractor.
 - 6. The Contractor shall furnish to the Environmental Consultant written documentation that each worker is medically approved to wear respirators and has been properly trained in their use, inspection, care, maintenance, and fit testing pursuant to the Contractor's written Respirator Plan.
 - 7. Breathing air supply systems shall conform to the USEPA NIOSH Document No. EPA-560-OPTS-86-0001 (April 1986) entitled "A Guide to Respiratory Protection for the Asbestos Abatement Industry". Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copies were directly written into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards, the more stringent requirements must be met in OSHA U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR1910, Section 1001 and Section 1910.134, 29 CFR 1926. CSA Canadian Standard Association, Rexdal, Ontario, Standard Z180.1-1978, "Compressed Breathing Air."

703-1.1.15 Protective Clothing

- A. The Contractor shall provide all workers, foremen, superintendents and authorized visitors and inspectors protective disposal clothing consisting of full-body coveralls, head covers, gloves, 18-inch high boot-type covers or reusable footwear, and eye protection in accordance with 29 CFR 1926.58(3)(g)(ii)(e).
- B. The Contractor shall provide hard hats and safety shoes as required by job conditions and safety regulations.
- C. Reusable footwear, hard-hats, and eye protection devices shall be left in the "Contaminated Equipment Room" until the end of the asbestos/lead abatement activities, at which time they shall be disposed of as ACM/Lead Contaminated Waste or transferred to another work area by methods approved by the Environmental Consultant.
- D. All disposal protective clothing shall be discarded and disposed of as asbestos/lead waste every time the wearer exits from the workspace to the outside through the decontamination facilities.

703-1.1.16 Enclosures, Showers And Toilets (Decontamination Facilities)

- A. All worker decontamination enclosure systems shall be provided at all locations where workers will enter or exit the removal area. At a minimum, one system at a single location is required. Such a system is anticipated to be a remote decontamination area established by the Contractor.
- B. Worker decontamination enclosure systems constructed at the project site shall utilize 6-mil. black or opaque polyethylene sheeting, or other approved materials for privacy.
- C. The Personnel Decontamination Unit shall not be located inside the removal area unless otherwise authorized by the Environmental Consultant.
- D. Alternate methods of providing decontamination facilities may be submitted to the Environmental Consultant for approval. The Contractor shall not proceed with any such method without written authorization.
- E. All equipment and tools must be decontaminated using a HEPA-filtered vacuum and/or wet cleaning techniques prior to storage. Replacement filters (in sealed containers until used) for filtration equipment, extra tools, containers or surfactant and other materials and equipment that may be required during the abatement may also be stored here as needed. A walk-off pan (a small children's swimming pool) or equivalent filled with water shall be utilized for workers to clean off foot coverings after leaving the removal area and to prevent excessive contamination of the worker decontamination system. A drum lined with a labeled 6-mil. polyethylene bag for the collection of disposable clothing shall be utilized. Contaminated footwear shall be stored in this area for reuse the following workday.

703-1.1.17 Personnel Protection And Decontamination

- A. The Contractor shall provide all personnel throughout the abatement process with the specified protective clothing and respiratory protection. The Contractor shall ensure that all personnel entering and leaving the workspace follow appropriate entry and exit procedures.
 - 1. The Contractor shall post written procedures in the workplace and train all personnel on the procedures for the evacuation of an injured worker. Provide air to a seriously injured worker without delay for decontamination. Make provisions to minimize exposure of rescue workers and to minimize spreading of contamination during evacuations and fire procedures.
 - 2. The Contractor shall instruct all employees and workers in the proper care of their personally issued respiratory equipment, including daily maintenance, sanitizing procedures, etc.
 - 3. All respiratory equipment shall be inspected by the Contractor's project supervisory personnel at the beginning of each work period, including breaks and lunch periods. Written records of these inspections shall be maintained and provided to the Environmental Consultant. During preparation work and prior to actual removal, the Contractor may use half-face HEPA respirators. During removal and cleaning of asbestos/lead containing materials PAPR's will be required.

703-1.1.18 Waste Disposal Procedures

- A. It is the responsibility of the Contractor to determine current waste handling, transportation, and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with all U.S. Department of Transportation, EPA, state and local regulations.
- B. Definition: Waste is defined as all asbestos and/or lead-containing or potentially contaminated materials and other items which have not been completely cleaned or sealed to the satisfaction of the Environmental Consultant while inside the work area and must be removed from the job site. Asbestos/Lead wastes may include building materials, insulation, disposable clothing, protective equipment, plastic sheeting, tape, exhaust systems or vacuum filters, Contractor equipment, or other materials designated by state, local authorities or the Environmental Consultant which have been potentially contaminated with asbestos/lead and have not been fully cleaned inside the removal area by vacuuming followed by thorough washing. The definition of waste also includes any universal waste that may be present within the current structures at the property.
- C. All waste material shall be promptly placed in 6-mil polyethylene bags or another acceptable container as it is generated. A sufficient number of waste bags shall be located in the immediate work area, and in the equipment (dirty) room of the Worker Decontamination Facility. The Contractor shall count the bags/containers and estimate the total volume leaving the work area, and maintain a written record of such (waste manifest).

- D. Warning labels, having waterproof print and permanent adhesive, in compliance with OSHA, EPA, NESHAPS and DOT requirements shall be affixed to or printed on the sides of all waste bags or transfer containers. All waste bags must have the generator's name and address including area where waste was generated.
- E. A fine water spray shall be used to keep the waste in the containers thoroughly wet at all times. When a waste bag is full, it shall be securely sealed with tape or other secure fastener.
- F. The following procedures shall be followed whenever containers or equipment are removed from the work area:
 - 1. All combustible rubbish and debris, including properly bagged asbestos/lead waste shall be properly disposed of at the end of each working day.
 - 2. The Clean Room shall be considered a holding area only during the period of active waste transfer for the purpose of the loading of carts or drums. Storage of waste in carts or drums in the clean room is prohibited.
 - 3. The cleaned waste containers and equipment shall be placed in uncontaminated leak tight plastic bags (or 6-mil sheeting if physical characteristics necessitate and permit). Air volume shall be minimized, and the bags or sheeting shall be sealed. Items that may puncture or tear the plastic bags or sheeting shall be placed in a hard wall container such as a drum, and then sealed.
 - 4. The re-containerized items of waste and clean-bagged equipment shall be placed in open top, watertight plastic carts or drums. These carts or drums shall be held in the holding area pending removal from the work area. The carts or drums shall be HEPA-vacuumed and wet-cleaned immediately following the removal of the containers of waste from them, and the location of where they are emptied shall also be HEPA-vacuumed.
 - 5. The exit from the waste decontamination facility shall be monitored and secured at all times to prevent unauthorized entry.
 - 6. The carts and drums may be temporarily stored in a holding area at the work site outside the workplace until a transport vehicle arrives, but such storage areas must be pre-approved by the Designated Owner's Representative and the Environmental Consultant.
- G. Waste Container Storage: Sealed waste bags may be temporarily stored in a pre-designated and approved outside area, until a truckload quantity is obtained or at the discretion of the Contractor. The temporary storage area shall be identified and posted with signs, and waste containers shall be covered with polyethylene sheeting or otherwise protected from further contamination.

- H. Waste Removal Scheduling: All waste containers shall be decontaminated and removed from the work area before final cleanup is started and isolation barriers are taken down. Once a truckload of waste containers has accumulated, the Contractor shall arrange for transportation to the disposal site. Waste shall not be stored in the work area or waste decontamination facilities. Outside bag storage must be monitored and secured at all times to prevent tampering. Storage must be in secure areas.
- I. Waste Transportation and Disposal Regulations: It is the responsibility of the Contractor to determine and insure that he is complying with: 1) the current waste handling regulations applicable to each work site; and 2) the current regulations for transporting and disposing of waste at each ultimate disposal landfill. The Contractor must comply fully with these regulations and with all U.S. Department of Transportation, EPA, Federal, state and local requirements.
1. The Contractor (or its Subcontractor) at no additional cost shall maintain a valid solid waste transportation registration issued by the California Department of Health Services, California Department of Toxic Substances Control (DTSC) or other applicable agencies, and obtain, complete, and fully comply with any other waste manifesting requirements.
 2. Transportation methods shall comply with the provisions of EPA Title 40, Part 61, Subpart M, Title 22 of the California Administrative Code, Division 4 Environmental Health, Chapter 30, Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes, and with any hazardous waste regulations for temporary storage, transport, and disposal if such codes are enforced in states where the waste shall be stored, transported or disposed of.
- J. Waste Container Removal and Disposal Procedure:
1. The costs for waste packaging, transportation, and approved landfill disposal (plus all related recordkeeping) shall be included in the Contractor's prices.
 2. The Contractor shall package, label, and remove all asbestos/lead/universal waste as specified in the above sections. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break.
 3. The Contractor shall provide legal transportation of asbestos/lead/universal wastes to the disposal landfill. The Contractor shall verify actual delivery, receipt, and disposal of each load of waste at the designated landfill.

4. Prior to any shipment of asbestos/lead/universal wastes, a manifest shall be properly completed and signed by the Environmental Consultant on behalf of the Owner. Additionally, the waste bags and any other containers shall be inspected by the Environmental Consultant and the Designated Owner's Representative, and only upon final approval by such representatives, will the shipment be released. Disposal shall be at an Approved Treatment, Storage, and Disposal Facility.

703-1.1.19 Exposure Controls

- A. If any are proposed and before starting any work, the Contractor shall submit in writing his proposed number, capacity, and location of HEPA-filtered exhaust units; and the method of discharge to the building exterior. Removal Work shall not be permitted until the Environmental Consultant approves the proposed exhaust system. Please note that for the abatement work to be completed is not anticipated to require exhaust units at this time.
- B. If utilized, the system must conform to the previously described requirements in 29 CFR 1926.58 Appendix F "Exhaust Air Filtration System."

703-1.1.20 Submittals

The Contractor shall furnish the following items clearly identified as stated:

- A. Copies of the following submittals shall be submitted to the Environmental Consultant. Submittals are to be approved before any abatement activities can begin (at or before the Pre-construction Meeting):
 1. Submittal No. 1: A detailed listing of all materials, tools, equipment, and expendable supplies that are to be used during the project. For each listed item, provide (as appropriate) the manufacturer's name, catalog number or model, a description of its function and location of use, and actual sample or photocopy of manufacturer's brochure. The listing shall include at a minimum: spray encapsulants, wetting agents, spray adhesives (including MSDS) and equipment, HEPA-vacuums, HEPA-filtered exhaust fans, respirators, protective clothing, waste containers, protective fireproof plastic coverings, sealing tapes, materials and compounds, temporary power and electric equipment, shower water pumps and filters, encapsulating equipment, and materials for constructing decontamination facilities and barriers.
 2. Submittal No. 2: A written "Security Plan" describing in general and specifically the location of warning signs. The labeling of waste containers, emergency means of ingress/egress from areas, security for prevention of unauthorized entry into the area, log book forms for recording entries to the work areas, accident prevention and notification policy, emergency fire and accident response procedures (including decontamination procedures), and personnel responsible for these items. The "Security Plan" shall also describe equipment and methods the

Contractor will use to efficiently communicate between personnel inside and outside work areas.

3. Submittal No. 3: Copies of all notifications as directed by the Designated Owner's Representative or Environmental Consultant. Notifications by Contractor shall be limited to only those parties the Contractor is required to notify by law.
4. Submittal No. 4: Detailed work schedules which list all the work areas: the dates of proposed work, the work shift times, the projected work accomplishments during that shift, and the number of workers (and the projected Supervisor/Foreman). The name and summary of the experience of all proposed principals, supervisors and foremen, and all other employees, which may be used during the contract period (minimum of one qualified supervisor and foreman is required).
5. Submittal No. 5: Signed documentation of training and education for all proposed workers including respirator use training, and copies of OSHA specified medical exams including respirator approvals.
6. Submittal No. 6: List of all Sub-Contractors proposed for this project, with their specialty and qualifications.
7. Submittal No. 7: Proposed waste hauler and copies of applicable licenses, including State of California registration number.
8. Submittal No. 8: Proposed landfill for disposal of waste materials and letter from landfill authorizing hauler to dispose of such waste.
9. Submittal No. 9: A copy of the Contractor's State of California Licenses, Department of Industrial Relations, Division of Occupation Safety and Health, Certificate of Registration for Asbestos and Lead Related Work and any other notifications required for the project.
10. Submittal No. 10: A copy of the Contractor's notification to the Division of Occupational Safety and Health in compliance with Title 8 of the California Code of Regulations, Section 341.9.

703-1.1.21 Submittals During The Work

Submit copies of the following items to the Environmental Consultant:

- A. Security and safety logs showing names of person entering the workspaces, social security number, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and health incident. These logs shall be provided to the Environmental Consultant on a daily basis.
- B. Disposal certificates. Copies (reproductions) shall be submitted at the completion of the job to the Environmental Consultant, and the original certificates submitted

to the Designated Owner's Representative. Manifests shall indicate the location where the waste was located prior to removal.

- C. HEPA unit static pressure differential readings daily (if applicable)
- D. Monitoring results as conducted by the Contractor's Representative shall be submitted on a daily basis to the Environmental Consultant.
- E. Contractor shall provide written inspection reports on all respiratory equipment to the Environmental Consultant on a daily basis.
- F. Recording/Printouts of negative pressure manometer readings (if applicable) inside containment shall be submitted on a daily basis to the Environmental Consultant.

703-1.2 Products

703-1.2.1 General Requirements

- A. The Contractor shall deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer, and details for proper storage and usage.
- B. All materials or equipment delivered to the site shall be unloaded, temporarily stored, and transferred to the work area in a manner, which shall not interfere with operations of the Owner.
- C. Unloading and temporary storage sites, and transfer routes, must be approved in advance by the Environmental Consultant and the Designated Owner's Representative.
- D. Damaged or deteriorated materials may not be used and must be promptly removed from the premises. Materials, which become contaminated, with asbestos-containing material or lead shall be packaged as ACM/Lead Containing and legally transported and disposed of in an approved, secure asbestos/lead landfill.

703-1.2.2 Materials, Tools And Equipment

- A. All materials, tools and equipment must comply at a minimum, with this specification, and relevant federal, state, and local codes.
 - 1. Plastic Sheeting and Bags - Shall be polyethylene or equivalent with a thickness of at least 6 mil for all applications. Fire retardant polyethylene shall be used throughout the duration of the project. Waste disposal bags shall be of 6-mil thickness with appropriate warning labels.
 - 2. Encapsulants and Surfactant (if utilized) - Shall be 50% polyethyleneoxyethylene ester and 50% polyethyleneoxyethylexellent ether or equivalent, mixed in the proportion of one ounce surfactant per

five gallons of water. The material must be odorless, non-flammable, nontoxic, non-irritating, and non-carcinogenic. It shall be applied as a mist using a low-pressure airless sprayer recommended by the surfactant manufacturer.

3. Tape and Glue - Shall be capable of sealing plastic to finished surfaces without damage when they are removed. The bonding strength and resulting seal integrity must not be affected by mist or water, encapsulating agent, or any other materials to be used in the work area.
4. Warning Signs and Labels - Shall comply with 29 CFR 1926.58(s), and all other federal state, local codes and regulations.
5. Transportation - Transportation methods shall comply with the provisions of EPA Title 40, Part 61, Subparts A and B, and with any hazardous or special waste regulations for temporary storage, transport, and disposal if such codes are enforced in states or cities where the waste will be generated, stored, transported or disposed of. All containers shall be labeled in accordance with OSHA Regulation 29 CFR 1926.58K(2), NESHAPS, and 49 CFR Parts 171 and 172, Hazardous Substances: Final Rule.
6. Respiratory Protection Devices - Shall be NIOSH and MSHA approved, and shall comply with all provisions of 29 CFR 1926.58. Fit testing procedures must comply with 29 CFR 1926.58 Appendix C.
7. Electrical Equipment - Shall be Underwriters Laboratory listed and approved, and shall have ground fault circuit interrupt protection which has been installed by a licensed electrician.
8. Ladders or Scaffolds - Shall be OSHA approved and be of sufficient dimensions and quantities so that all work surfaces can be easily and safely accessed by the workers, and other inspectors. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos fibers.
9. Hand Power Tools - Shall be equipped with HEPA-filtered local exhaust ventilation if used to drill, cut into, or otherwise disturb ACM/LBP.
10. Brushes - All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into small fibers. Wire brushes may be used on pipe joint applications upon prior written approval by the Environmental Consultant.

703-1.3 Removal Procedures

703-1.3.1 Pre-Asbestos/Lead Abatement Preparations

The Contractor shall prepare the work area as described in this section. Preparation work shall be performed according to the following general sequence of steps and

procedures to insure that proper containment and protection systems are installed prior to any work which could generate airborne asbestos fibers/lead dust:

- A. Remove and relocate any non fixed items (not removed by the Owner) to storage areas designated by the Designated Owner's Representative.
- B. Isolate, clean by HEPA vacuuming and washing, and seal airtight with plastic and tape all HVAC system (if applicable) diffuses, grills, and registers in or servicing the work area.
- C. Carefully clean all surfaces in the work area, which may be contaminated with any dust or debris by using wet methods and a vacuum equipped with a HEPA filter.
- D. Cover any window or other opening with double-layered polyethylene sheeting.
- E. Isolate all electrical systems as directed by the Designated Owner's Representative, and provide temporary power and lighting as required for the work area and affected non work areas.
- F. Obtain the Environmental Consultant's written approval of all preparation work before starting removal of waste materials.

703-1.3.2

Isolation Of Electrical Systems And Installation Of Temporary Power And Lighting

- A. The scope of the required electrical isolation and protection work includes isolation and protection of electrical equipment that is in the area from which asbestos and lead must be removed, and could therefore possibly become a hazard through contact or water spray short-circuiting. Shutdown of electrical circuits shall include providing labor to monitor, inspect, and service temporary power circuits, lighting, and equipment as required by local codes and regulations. Contractor must provide "Lock Out" system on all electrical panels or equipment that will be shutoff during the removal process.
- B. Temporary lighting shall be provided by the Contractor in the work area where asbestos and lead removal is performed. The Contractor's licensed electrician as mutually agreed upon by the Designated Owner's Representative and Contractor and hereinafter referred to as Contractor's licensed electrician shall initially inspect the removal work area for the condition of electrical conduit and junction boxes. The purpose of this inspection is to assist the Contractor in the preparation and performance of his work, and to provide for the safety of work crews.
- C. All materials and workmanship shall conform with the latest editions of the following codes, standards, and specifications:
 - 1. National Electrical Code (NEC) - most recent edition

2. National Bureau of Standards, Handbook H30, National Electrical Safety Code
 3. State and Local codes, and all other authorities having jurisdiction
 4. Underwriter Laboratories (UL)
 5. Nation board of Fire Underwriters
 6. OSHA
 7. Factory Mutual
- D. Temporary lighting and power systems shall exceed all OSHA, state, and local regulations; temporary lighting levels shall exceed OSHA requirements and provide surface lighting for nighttime work.
- E. The Contractor is responsible for visiting the site to investigate existing electrical conditions and isolation requirements.
- F. When switching circuits at panels, the Contractor's electrician shall review the existing directory. The Contractor shall not shutdown any circuits without the advanced notification and approval of the Designated Owner's Representative.
- G. All Contractor costs associated with the isolation of electrical systems and installation of temporary power and lighting must be included.
- H. The non-current carrying metal parts of fixed, portable and plug connected equipment shall be grounded. Portable tools and appliances protected by an approved system of double insulation need not be grounded. All lighting and power circuits in the asbestos and lead removal area shall be ground fault protected.
- I. Extension cords shall be the 3 wire type; shall be protected from damage; and shall not be fastened with stales, hug from nails, or suspended from wires. Splices shall have soldered wire connections with insulation equal to the cable. Worn or frayed cords shall not be used.
- J. Safe lighting equipment shall be provided with waterproof floodlights. Exposed bulbs shall be guarded to prevent accidental contact. Temporary wiring shall be properly insulated and substantially support. Circuits shall be properly designed and fused. All temporary lighting inside the asbestos removal area shall be weather-proofed.
- K. Receptacles for attachment plugs shall be approved, concealed contact type. Where different voltages, frequencies, or types of current are supplied receptacles shall be of such design that attachment plugs are not interchangeable.
- L. Each disconnecting means for motor and appliances and each service federal or branch circuit at the point where it originates, shall be legibly marked to indicate its purpose.

703-1.3.3 Installation Of Decontamination System

See Section 703-1.1.16

703-1.3.4 Cleaning Of Asbestos/Lead Contaminated Surface

- A. This section pertains to the cleaning of surfaces which are potentially contaminated with asbestos-containing and/or lead dust and debris. Such cleaning shall be required to prevent this dust from becoming airborne and posing an exposure risk or interfering in air monitoring activities. Cleaning action shall be performed as preliminary exposure control procedures prior to performing other actions which are required. Cleaning shall consist of HEPA vacuuming followed by wet mopping of surfaces in a manner, which prevents dust generation, but effectively rids the surface of all visible debris, dust, film, and grime.
- B. Each HEPA vacuum cleaner shall be separately equipped with an airtight securely attached hose of proper length and a collection wand, brushes and other special attachments appropriate to the required cleaning tasks. The equipment shall be properly operable at all times and shall contain no air leaks. The Environmental Consultant shall inspect and request verification of the efficiency of the equipment's filtration (manufacturer's equipment data sheets).
- C. Cleaning Procedure:
1. Remove large pieces of debris by hand, and then dry vacuum all surfaces using HEPA filtered equipment and a collection attachment which minimizes dust generation. Surface shall be cleaned by working outward from the point of access so that workers do not walk on or disrupt uncleaned surfaces.
 2. Lightly wet the surface of any material that produces airborne fibers/dust by using an airless sprayer and amended water.
 3. Collect, package, label, and dispose of vacuumed material as asbestos/lead waste (as described in the following sections).
 4. Thoroughly wet wipe or mop all surfaces to remove any remaining dirt or grime, being careful not to wet or damage any electrical equipment, furniture, or other sensitive surfaces.
 5. Allow surfaces to completely dry, and then inspect them for any visible remaining dirt or fibrous material.
 6. HEPA vacuum any remaining dirt or fibers using an efficient collection attachment.
 7. Collect and pump all wastewater through a 5 micron filter (multistage filtration system). Dispose of filtered material (and the filters) as asbestos waste.

8. Request Environmental Consultant to conduct final inspection of cleaning work prior to performing any other specified actions.

703-1.3.5 Isolation Of Asbestos Containment Work Areas

A. Work area Isolation and Protection for Asbestos-Containing Materials:

1. The Contractor shall isolate the work area for the duration of work by completely closing and sealing all openings and doorways into the work area including, but not limited to, heating and ventilation ducts, doorways, windows, floors and ceiling penetrations, and lighting. Isolation/sealing shall be accomplished by using two (2) layers of 6 mil plastic sheeting taped securely in place, or by caulking, including the construction as noted in 3 below. The work area shall be protected and sealed airtight to the extent possible, and be subject to the approval of the Environmental Consultant.
2. Emergency and fire exits shall be maintained.
3. Shutdown and isolate any heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the property.
4. Thoroughly preclean all dust or debris from any fixed objects, floors, walls, or other equipment within the work area using HEPA vacuuming equipment and wet washing. Do not use dry brooms, brushes, mops or non-HEPA vacuum cleaners for any precleaning work. Seal all seams, joints, covers or casings with tape, and enclose fixed objects or equipment with a minimum of two layers of 6 mil plastic sheeting secured and sealed airtight with duct tape.
5. Cover floor and walls with a minimum two (2) independent layers of 6 mil plastic sheeting, turning each layer of floor polyethylene up the wall a minimum of 16" and fasten them securely to the wall. Cover walls with two (2) layers of 6 mil plastic sheets extending to floor, overlapping the two (2) floor sheets by not less than 12" excluding the turn-up. All joints in plastic sheets shall be taped and glued in a manner to prohibit air movement, and to prevent passage of water or other liquids. The bottom layer of floor polyethylene shall be securely fastened to the floor to prevent creases or slippage that would pose a hazard to workers. Any floor drains or other openings shall be sealed individually with two (2) layers of 6 mil sheeting and tape, and then covered by the remaining two (2) layers of polyethylene. Pits, pumps and other openings shall be covered so as to prevent a tripping hazard and then covered with two (2) layers of 6- mil sheeting.
6. The Contractor shall post warning signs in English and Spanish meeting the requirements of OSHA 29 CFR 1926.58(k)(1) and (k)(2)(ii) at the outside doorway to the Decontamination Facility which shall be the only non emergency entrance into the work area. The Environmental Consultant may also request that the Contractor post additional warning

signs around the work area or at other potential entrances or exposure points in accordance with California Proposition 65. Warning signs shall be readily visible to any person attempting to enter the work area.

7. All waste will be disposed and packaged as specified in Section 1.18.

703-1.3.6 Isolation Of Lead Containment Work Areas

See Section 703-1.3.5

703-1.3.7 Approval Of Asbestos/Lead Work Area

After the asbestos/lead removal work area has been prepared as specified above, the Contractor shall request a formal site inspection by the Environmental Consultant. No removal, demolition or other disturbance of asbestos/lead containing materials, dust or debris shall occur until the Environmental Consultant has inspected and approved the site preparation work in writing.

703-1.3.8 Waste Removal Procedures

- A. This section covers the removal of asbestos and lead containing materials as specified in the documents or as directed by the Environmental Consultant. Universal waste shall be physically removed in a conventional manner by the Contractor in accordance with typical industry standards.
- B. Amended water (wetting agent), mixed and carefully applied using an airless sprayer as specified by the manufacturer, shall continuously be used to control the release of asbestos fibers and lead dust prior to and during removal. The amended water shall be applied in sufficient quantity to fully saturate the non-friable material before it is removed.
- C. Removal Methods:
 1. No removal work shall begin until the work area has been prepared and approved by the Environmental Consultant as summarized in the preceding section. Removal workers shall wear a negative pressure air purifying respirators and protective clothing as previously described throughout all removal, cleanup and waste handling operations.
 2. Small test patches of waste materials shall be wetted, and then removed and examined by the Environmental Consultant and Supervisor to determine degree of saturation prior to removing the bulk of the material. With prior approval, the Contractor may use removal encapsulants instead of amended water; applied per manufacturer and federal guidelines.
 3. After large areas of the waste materials have been fully wetted and tested, the materials shall be carefully removed in small sections by using hand scrapers or other suitable tools.

4. As the material is removed, it shall be promptly wetted and packed into impermeable, labeled 6 mil polyethylene disposal bags. When each bag is full, the packaged material shall be sprayed with amended water, sealed (using duct tape or other fastener as approved by the Environmental Consultant), and transported to a temporary storage area inside the work area.
5. The Contractor shall repeatedly spray the waste materials to prevent them from drying out.
6. Once the majority of the waste is removed, the Contractor shall scrub the substrate surface with a nylon brush or equivalent, and a water spray, and then thoroughly wash it to remove all remaining material.
7. After obtaining written approval of the cleaning from the Environmental Consultant, the Contractor shall then seal all substrate surfaces from which waste material was removed with at least one (1) coat of an approved penetrating encapsulant.
8. The Contractor shall minimize contamination on the workfloor, the exterior of disposal containers, and all other surfaces within the work area. At the end of each shift, all surfaces shall be cleaned of all materials and then HEPA vacuumed or wet mopped.
9. The decontamination facility shall be wet cleaned (a minimum of two times) using wet cleaning methods upon completion of any waste removal.
10. The decontamination facility shall be wet cleaned and HEPA vacuumed, as appropriate, after each shift change and meal break.
11. Excessive water accumulation or flooding in work area shall require work to stop until the water is collected and disposed of properly.

703-1.3.9 Approval Of Waste Removal Work

- A. Upon completion of removal work, but prior to commencing encapsulation or post-abatement cleaning of the work area, the Contractor shall request the Environmental Consultant to conduct an inspection and approval of the removal work.
- B. All asbestos materials, gross debris, waste bags and equipment shall be removed from the work area prior to this approval.

703-1.3.10 Isolation Of Work Areas

See Section 703-1.3.5.

703-1.3.11 Final Inspection

The Environmental Consultant will perform a final visual inspection of the work area.

703-1.3.12 Monitoring, Testing And Inspection

- A. The performance and execution of the work shall be closely and continuously monitored by the Environmental Consultant. The monitoring work shall be performed both inside the work area and the surrounding areas to ensure full compliance with these specifications and all other applicable regulations. Ambient air samples will be collected and analyzed by the Environmental Consultant. The Contractor shall provide full cooperation and support to the Environmental Consultant and technicians throughout the work. Monitoring and inspections shall include air samples in the workspace, periodic air samples at worker breathing levels, air samples in the areas surrounding the work areas, checking the Contractor's standard operating procedures, engineering controls, respiratory protection equipment, packing, packaging, transporting and disposal of asbestos, decontamination facilities and procedures, and any other aspects of the abatement process that may impact the health and safety of the people and the pollution of the environment. Lead clearance will be conducted using wipe samples if deemed warranted by the Environmental Consultant.
- B. The Owner shall bear all cost in connection with the laboratory work required in Paragraph A above. However, the Contractor shall conduct and bear the cost of any personal air samples for OSHA compliance.
- C. At the Contractor's request, the Contractor shall be provided copies of all laboratory reports presenting the results of the Environmental Consultant's air monitoring and inspection program. All information shall be recorded in the Contractor's air monitoring log.

703-1.3.13 Air Monitoring By Contractor

- A. The Contractor shall be responsible for personal air monitoring to document compliance of their workers with OSHA regulations using the methods as reiterated below.
- B. The sampling person and analysis laboratory performing this work shall be an independent party not financially or managerially connected to the Contractor.
- C. The laboratory shall be successfully participating in the AIHA/NIOSH Proficiency Analytical Testing (PAT) program.
- D. Air sampling materials and equipment requirements are as follows:
 - 1. Sampling for analysis by phase contract microscopy shall employ cellulose ester collection filters with 0.8 micron pore size or less. Cassettes shall be loaded with filters under clean laboratory conditions. A 0.5 micron pore size cellulose ester backing filter shall be placed behind the collecting filter, followed by the cellulose support pad and the cassette base. A electrically conductive cowl shall be used in conjunction with the sampling train.
 - 2. The filter assembly shall be upstream of all other components in the sampling train. An air flow measuring device (when used) shall be

downstream of the filter and the pump assembly, or integral with the pump assembly.

3. Sampling pumps shall supply constant flow.
 4. An air flow measuring/metering device shall be used, and shall be high quality rotometer, mass flow, dry gas meter or critical orifice. Measuring devices shall have a range of at least 1.5 times the desired flow rate and be readable to at least + or -5% of the desired flow rate. They shall be calibrated against standards of higher accuracy before and after sampling. The calibrations shall be recorded.
- E. Numbers and frequencies of personal air sampling shall be as required by OSHA regulations but not less than (1) sample per eight (8) hour work shift during times of asbestos removal work.
 - F. Results of sample analysis shall be provided to the Environmental Consultant within twenty-four (24) hours of collection.
 - G. All other air sampling for compliance with the Specifications shall be performed by the Environmental Consultant at no cost to the Contractor.
 - H. The Contractor shall use a pre-approved "chain of custody" form for all personal air samples he collects.
 - I. Personal sampling shall be performed pursuant to NIOSH Method 7400.
 - J. Representative personal air monitoring will be conducted during all aspects of the project to determine if any employee exceeds the Personal Exposure Limit (PEL) Limit for asbestos of 0.5 f/cc and lead of 50 ug/m³.

703-1.3.14 Final Inspection And Testing

- A. After a minimum of two (2) cleaning of the workspace, and if a high degree of cleanliness has been achieved, the Contractor shall notify the Environmental Consultant that the workspace is ready for inspection and final testing. The Environmental Consultant with the assistance of his technician and the Contractor shall then visually inspect the workspace for the detection of any visible asbestos dust or contamination. If the visual inspection does not reveal any dust or other signs of contamination, final air/wipe testing shall commence.
- B. The final test shall consist of taking air samples in the workspace to establish that airborne fiber levels do not exceed 0.01 f/cc as determined by PCM. Transmission electron microscopy analysis (TEM) may also be employed to confirm the results of the final testing by NIOSH Method 7400. Lead clearance (if deemed warranted by the Environmental Consultant) will be conducted using wipe sampling techniques. The California Department of Health Services clearance level of 40 micrograms per square foot (µg/ft²) will be utilized during such clearance sampling activities for lead. If the results of the

final testing are not satisfactory, wet cleaning and/or HEPA vacuuming shall be repeated until the required decontamination levels are achieved.

- C. After achieving the level of cleanliness and decontamination as specified herein and as confirmed by the final testing and checking, the Environmental Consultant shall thoroughly inspect the space jointly with the Contractor to determine whether any damage has been done on the finishes, equipment or any other part of the work space.

703-1.3.15 Responsibility For Damages

Any damages to improvements that are not subject to the proposed demolition of the structures that have been the result of actions by the Contractor's personnel shall be repaired to their original condition without any additional cost to the Owner.

703-1.3.16 Restoration And Repairs

Repair and restore space in accordance with the final inspection list specified herein. All surfaces within the work area must be free and clean of residues including but not limited to encapsulants, glue, tape, polyethylene, etc.

703-1.4 Definitions

Where applicable or stated, terms shall have the following definitions:

- A. All terms not defined herein have the meaning given in the applicable publications and regulations.
- B. Abatement Activities shall mean all activities from the initiation of work area preparation through successful clearance air monitoring performed at the conclusion of an asbestos project.
- C. Air Lock shall mean a confined space designed to control air movement between two areas. It is composed of sealed spaces with curtained doorways at its portals. A Worker Decontamination Facility contains at least three air locks.
- D. Ambient Air Monitoring shall mean measurement or determination of airborne asbestos fiber concentrations outside but in the general vicinity of the work site.
- E. Amended Water or Wetting Agent shall mean water to which an approved surfactant has been added in proportion of at least one (1) ounce surfactant to five (5) gallons water.
- F. Asbestos-Containing Materials (ACM) shall mean any insulation, fireproofing, plaster, ceiling or floor tiles, and any other building materials containing a detectable amount of asbestos.
- G. Asbestos-Contaminated Objects shall mean any objects which may be contaminated by asbestos or asbestos-containing material as determined by the Environmental Consultant.

- H. Asbestos Disposal shall mean the removal of containerized asbestos, asbestos-containing material, asbestos-containing waste material and asbestos-contaminated objects from the regulated area to the final EPA approved disposal site.
- I. Authorized Visitors any visitor authorized by the Environmental Consultant or any representative of a regulatory agency or other agency having jurisdiction over the project.
- J. Barriers or Containment Barriers shall mean walls, tunnels, or enclosures erected to separate any section of an abatement area from adjoining spaces. Where indicated on drawings, barriers shall be constructed of 2'x 4's, 10" o.c. with minimum 1/2" plywood walls, and all seams in plywood and edges shall be sealed airtight with caulking. The inside (work) side of all such barriers shall be covered with two (2) layers of 6-mil polyethylene sheeting. Tunnels to maintain public access through a work area shall also be defined as part of the barriers. All lumber, plywood and polyethylene shall be flame retardant and shall bear manufacturer's label.
- K. Baseline or Background Air Monitoring shall mean a measurement or determination of airborne asbestos fiber concentrations inside the workplace and outside a building prior to starting abatement activities.
- L. Certified Clean shall mean that a work area has no visible signs of fibrous materials or other contamination, and does not have levels of airborne fiber above the defined air clearance criteria.
- M. Clean or Decontaminate shall mean to make a surface free of all visible and optically-detectable fibers by thoroughly HEPA-vacuuming and wet washing with sponges and mops.
- N. Contractor shall mean the asbestos and lead abatement Contractor.
- O. Curtained Doorway or Entrance shall mean a portal which limits air movement between two areas, constructed by placing two overlapping sheets of plastic over an existing or temporary doorway, by securing each along the top of the doorway, by securing the vertical edge of one sheet along one vertical side of the doorway, and by securing the vertical edge of the other sheet along the opposite vertical side of the doorway.
- P. Decontamination Facility (DF) or Area shall mean a series of connected rooms or spaces including Clean and Shower Rooms, and contaminated dirty (equipment) room, each separated by an air lock; and used for the decontamination of all workers, and their personal protective equipment leaving an asbestos removal work area, as well as for access to such work areas. All decontamination facilities shall be a "structural" (i.e. capable of supporting workers standing above).
- Q. Designated Owner's Representative shall be the construction manager of the Owner

- R. Disposal Site shall be an EPA and/or State approved and permitted landfill facility licensed to handle the applicable waste. Disposal Site as used in this Section (809) is only applicable to Section 809. Disposal Site or Disposal Facility as used in Section 804 (Contaminated Soil) is defined separately for the purposes of that Section.
- S. Disturb shall mean to alter, change, or stir, such as but not limited to the removal, encapsulation, enclosure or repair of asbestos-containing or asbestos contaminated material.
- T. Encapsulation shall mean procedures necessary to coat or saturate material with an approved encapsulant liquid to control the possible release of fibers into the ambient air. "Encapsulant" (Sealant) shall mean liquid material which can be applied to other solid material which reduces the possible release of fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).
- U. Environmental Consultant shall mean the Owner contracted environmental consultant who will oversee the abatement work.
- V. Fiber and acicular single crystal or a similarly elongated polyethylene crystalline aggregate which displays some resemblance to organic fibers by having such properties as flexibility, high aspect ration, silky luster, axial lineation, and other, and which has attained its shape primarily through growth rather than cleavage.
- W. Final Cleaning shall mean that no three dimensional material is visible to the naked eye.
- X. Fixed Items shall mean equipment, furniture, radiators, or other objects which cannot be removed from the work area, plus walls and floors.
- Y. Furnished or Supply shall mean purchase, deliver to, and off-load at the job site, all ready to be installed, including where appropriate, all necessary interim storage and protection.
- Z. HEPA-Filtered Exhaust Units or Fans shall mean a fan equipped with a High Efficiency Particulate Air (HEPA) filter, greater than 99.97 percent efficient by 0.3 micron DOP test, and complying with ANSI z9.2 (1979), Local Exhaust Ventilation. It shall be used to create a pressure in a work area (reduced with respect to surrounding areas) in order to prevent the escape of asbestos fibers. It shall also be used to reduce and control the airborne concentration of asbestos fibers.
 - AA. HEPA-Filtered Vacuum shall be a vacuum cleaner specifically designed for and equipped with HEPA-filtration.
 - BB. Install shall mean set in place completely ready for normal use or service, including all necessary mounting facilities, connections and testing.

- CC. Isolation Barriers shall mean the construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the workplace from surrounding areas and to contain asbestos fibers in the work area.
- DD. Lockout shall mean the safe, approved means for shutting down HVAC equipment, electrical panels or breakers and water so that they cannot be inadvertently turned back on.
- EE. Log shall mean an official record of all activities that occurred during the project and it shall identify the building owner, agent, Contractor, workers, floor number, date, work area, and other relevant information to the project.
- FF. Major Abatement shall mean the removal of ACM under contained conditions utilizing full isolation and negative pressure ventilation systems.
- GG. Minor Abatement shall mean the removal of ACM utilizing "glove bag" methods or modified containment.
- HH. Outside Air shall mean the air outside the buildings and structures.
- II. Outside/Ambient Air Samples shall mean samples collected outside of the containment area in the building and analyzed using the NIOSH 7400 Method.
- JJ. Protect Fixed Items shall mean to cover with solid enclosures and 6-mil polyethylene sheeting, and secure by taping or gluing waterproof and airtight.
- KK. Provide shall furnish (or supply) and install.
- LL. Regulated Area shall have the meaning set forth in 29 CFR 1926.52(b)
- MM. Remove Asbestos shall mean to make a surface free of all visible fibrous materials or microscopically-detectable asbestos fibers.
- NN. Renovation shall mean an addition or alteration or a change or modification of building or the service equipment thereof, which is not classified as an ordinary repair.
- OO. Repair shall mean corrective action using specified work practices (e.g. glovebag, plastic tent procedures, etc) to minimize the likelihood of fiber release from minimally damages area of ACM.
- PP. Replacement Material shall mean any material approved by the Owner used to replace ACM.
- QQ. Environmental Consultant shall mean the Owner contracted environmental consultant who will oversee the abatement work.

- RR. Seal, or Block and Seal shall mean preparing a space or area such that there is no air movement or passage to and from the area. "Isolation barrier" shall mean the system of seals or other items which prevent air movement to and from any work area.
- SS. Shift shall mean a worker's or simultaneous group of workers' complete daily term of work.
- TT. Surface Barriers, Protective Coverings or Polyethylene shall mean the plasticizing of walls, floors, and fixed objects within the work area to prevent contamination during subsequent abatement activities.
- UU. Surfactant shall mean a chemical wetting agent added to water to improve penetration into asbestos-containing materials and thereby reduce the generation of airborne asbestos fibers.
- VV. Work Area shall mean an area where asbestos removal or other abatement procedures are being performed. A work area is considered a contaminated space between the time preparation begins and the time the area is certified clean by the Environmental Consultant.
- WW. Work Place shall mean the work area and the decontamination enclosure

703-2

CONTAMINATED SOIL REMOVAL

703-2.1

Related Documents

1. Interim Report of Site Assessment, 1595 Pacific Highway, LeRoy Crandall & Associates, dated October 1, 1990;
2. Report of Site Assessment, 1595 Pacific Highway, Law/Crandall, Inc., dated November 20, 1991;
3. Report of Ground Water Monitoring May – June 1992, 1595 Pacific Highway, Law/Crandall, Inc., dated July 7, 1992;
4. Report of Ground Water Monitoring December 1992, 1595 Pacific Highway, Law/Crandall, Inc., dated January 27, 1993;
5. Report of Ground Water Monitoring June 1993, 1595 Pacific Highway, Law/Crandall, Inc., dated July 7, 1993;
6. Limited Phase II Environmental Site Assessment, 1595 Pacific Highway, Ninyo & Moore, dated October 21, 2005;
7. Geotechnical and Fault Investigation, Bayside Fire Station, Leighton & Associates, dated April 3, 2009; and
8. Remedial Action and Property Mitigation Plan, Fire Station No. 2 (Bayside), 1595 Pacific Highway, San Diego, California 92101, Advantage Environmental Consultants, LLC, dated July 29, 2011.

9. Workplan Approval, Voluntary Assistance Program (VAP), File #H23307-003, Bayside Fire Station, 1595 Pacific Highway, San Diego, CA 92101, dated September 8, 2011.

703-2.2

Key Definitions

Clean Soil: Soil that is documented by analytical laboratory testing to contain total lead at levels below 15 milligrams per kilogram (mg/kg) and levels of other metals below San Diego Regional Water Quality Control Board (SD-RWQCB) Tier 1 soil screening levels (SSLs) as outlined in Resolution R9-2014-0041 (Conditional Waiver No. 10). Clean Soil is also not known or reasonably suspected to contain detectable concentrations of any other Hazardous Substances, including but not limited to petroleum hydrocarbons, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and Polychlorinated Biphenyls (PCBs). Clean Soil is not subject to waste classification/disposal/reuse regulations, and is suitable for reuse as fill material within the limits of the Fire Station No. 2 (Bayside) project Site or at other off-Site Contractor selected receiving facilities. Clean Soil refers to non-contaminated soil that is generated from within the Site boundaries and any import soils to be delivered to the Site.

Construction Envelope: Refers to all soil that will be disturbed by project earthwork activities plus any additional earthwork that may be required to comply with health and safety requirements.

Contaminated Soil: Soil that does not meet the definition of "Clean Soil."

Contractor: The company managing and/or self-performing all of the construction/remediation activities for the proposed project (with the exception of those tasks to be performed by others as described herein).

County of San Diego Department of Environmental Health (DEH): County of San Diego Department of Environmental Health, the local agency who will be providing regulatory oversight of the proposed remediation activities to be completed at the Site.

Designated Owner's Representative: The construction manager for the Owner and City.

Environmental Consultant: The Owner contracted Environmental Consultant (Advantage Environmental Consultants, LLC) who shall oversee and coordinate all excavation, segregation, handling, stockpiling and loading of soil during the proposed excavation activities in conjunction with the Contractor to ensure that such activities are completed in accordance with applicable environmental laws/regulations and the Remedial Action Plan (RAP)/Property Mitigation Plan (PMP) for the project. The Environmental Consultant shall also evaluate soil that is to be imported to the property for backfilling purposes (if applicable). The Environmental Consultant has demonstrated knowledge of, and professional experience in the observation of environmental excavating activities, environmental and geologic conditions at the Site, and recognition of, and testing for hazardous substances and conditions. The Environmental Consultant is provided by the Owner and tasks to be performed by the Environmental Consultant should be not included in the Contractor's bid.

Hazardous Substance: As defined in the California Health and Safety Code

Non-Hazardous Waste: Contaminated Soil that may be disposed of at a California Class I, II or Class III (municipal) landfill or treatment facility. Such soil does not contain contaminants at concentrations considered to be hazardous by the State of California and can be transported to designated receiving facilities under a Non-Hazardous Waste manifest.

Non-Resource Conservation and Recovery Act (RCRA) Hazardous Waste: Contaminated Soil that may be disposed of at a California Class I or II landfill or treatment facility and that contains contaminants at concentrations considered to be hazardous by the State of California. Such soil does not contain contaminants at concentrations considered to be hazardous by Federal standards and is often referred to as "California-hazardous waste." For the purposes of this specification, such soil will be referred to as Non-RCRA Hazardous Waste and can be transported to designated receiving facilities under a uniform hazardous waste manifest.

Owner: The Owner will retain a contractor on behalf of the City of San Diego to construct a new fire station to be identified as Fire Station No. 2 (Bayside), which includes the demolition of existing improvements at the site.

Remedial Action Plan (RAP)/Property Mitigation Plan (PMP): RAPs and PMPs are work plans outlining remedial actions to be performed at a specific Site. The RAP/PMP for the Fire Station No. 2 (Bayside) project has been prepared by the Environmental Consultant, has been made available to the Contractor as part of the bid documents and is titled Remedial Action and Property Mitigation Plan Fire Station No. 2 (Bayside), 1595 Pacific Highway, San Diego, California 92101. The RAP/PMP is dated July 29, 2011 and was approved by the DEH on September 8, 2011.

Remedial Excavation: Remedial Excavation includes the segregation, excavation and loading (to trucks) of Contaminated Soil under the oversight of the Environmental Consultant. This is anticipated to include stockpiling and may include handling/movement of such soil on multiple occasions depending on the nature and extent of contamination encountered. Exploration by test-pitting may also be required at the direction of the Environmental Consultant. There will be no compensation for exploratory test-pitting. Remedial Excavation is to be all inclusive of all items and tasks discussed in this Section 804, including but not limited to, visqueen/plastic sheeting to cover soil stockpiles, printing and provision of waste manifests, Contractor health and safety plan, any Contractor health and safety training, licensing and/or certifications relative to the handling of hazardous materials and waste, Contractor health and safety meetings, excavation around unidentified underground storage tanks that may be encountered, personal protective equipment, dust control measures, vapor control/aeration (if required) and any other activities typically conducted on remedial excavation projects. Remedial Excavation also includes Contractor provision of legible, fully executed non-hazardous and hazardous waste manifests and receiving facility weight tickets pertaining to Contaminated Soil that is removed from the property. Such documentation is to be scanned and provided to the Designated Owner's Representative and Environmental Consultant electronically on a CD-ROM.

Site: The property located at 1595 Pacific Highway and southeast of the intersection of Pacific Highway and West Cedar Street in downtown San Diego, California.

Site Safety Manager: Designee of and retained by the Contractor responsible for the day-to-day health and safety management of the workplace (job-Site) with the appropriate qualifications, licenses, training, and experience.

703-2.3

Contaminant Distribution

Lead and Petroleum Hydrocarbon Impacted Soil

Lead-impacted soil at the Site is anticipated to be located at three localized locations, two of the locations within the upper 0.5 foot to 2.5 feet of soil at the Site, and one of the locations in a former underground storage tank (UST) cavity from approximately 0.5 foot to 10 feet below the surface. The Site is underlain by undocumented fill material at generally shallow depths with some deeper anomalous areas identified during prior assessment activities, followed by the colluvium and Old Paralic Deposit Unit 6 (Bay Point Formation). Such fill material has been found to contain lead above typical background/naturally occurring concentrations. Based on available total lead data, it is anticipated the lead-impacted soil will likely be profiled as a Non-Hazardous Waste. Within the excavation footprint, lead-impacted soil will be excavated, stockpiled and sampled and then either removed from the Site as a regulated waste to off-Site permitted receiving facilities (described in Section 804-2.10), or as inert waste employing the criteria set forth in the SD-RWQCB Resolution R9-2014-0041 (Conditional Waiver No. 10). At this time, it is anticipated that approximately 425 cubic yards (720 tons) of lead impacted soil will be excavated during the remedial work and will require off-Site disposal as a regulated waste.

Releases of petroleum hydrocarbons have impacted vadose, capillary and saturated zone soils beneath the Site, at a minimum from the static groundwater table to generally no shallower than five feet from existing grades, throughout approximately three-quarters of the Site. The RAP/PMP proposes the removal of petroleum hydrocarbon impacted soil within the excavation footprint to a maximum depth of approximately 15 feet below the ground surface. The petroleum hydrocarbon impacted soil will likely be profiled as a Non-Hazardous Waste and all petroleum impacted soil will be disposed of at off-Site, permitted regulated receiving facilities (described in Section 804-2.10). At this time, it is anticipated that approximately 1,075 cubic yards (approximately 1,830 tons of petroleum hydrocarbon impacted soil) will be excavated during the proposed excavation and remedial activities. Petroleum impacts are expected to reach the bottom of the proposed depths of excavation at the impacted areas at the Site based on a review of available data. Petroleum hydrocarbon and VOC impacted soils beneath the Site are the result of gasoline and diesel releases likely associated with the UST system for the former gasoline service station that operated at the Site between 1940 and 1971. Up to six underground storage tanks were documented to have been previously used at the Site.

The Contaminated Soil quantity estimates as discussed in this bid specification and presented on the bid form for the project rule over any other discussion of Contaminated Soil quantity estimates as presented in the RAP/PMP or other prior environmental documents pertaining to the Site.

703-2.4

Summary

This specification section outlines criteria for the excavation, handling, transport and off-Site disposal of Contaminated Soil (Remedial Excavation) associated with excavation activities at the Fire Station No. 2 (Bayside) project in downtown San Diego, California.

At the direction of the Environmental Consultant, the Contractor shall manage Contaminated Soils encountered on the Site and in the excavation in a manner that ensures the protection of health, safety, public welfare, and the environment. The handling, storage, transportation and disposal of Contaminated Soils shall be conducted in compliance with the provisions of all applicable federal, state, and local laws, regulations and bylaws, and the criteria outlined in this specification and the RAP/PMP document. The Contractor (or its subcontractors) who will handle Contaminated Soil shall hold a Class A, Engineering Contractor's license with a Hazardous Substance Removal Certification (HAZ) issued by the State of California. Copies of such a license and certification can be provided to the Owner at the time of the bid opening but must be provided to the Owner no later than five business days following the bid opening.

Excavation, loading, transporting, and legal off-Site disposal of Contaminated Soil (Remedial Excavation) according to the criteria contained herein shall be conducted by the Contractor. The Contractor shall provide excavation, loading, transport and disposal services, including all related fees and cost. The Contractor is not responsible for the collection and/or laboratory analysis of soil samples. The Environmental Consultant will provide the laboratory analyses required by the disposal facilities for Contaminated Soil acceptance conduct all soil waste profiling activities and will be responsible for all regulatory interface and reporting during the completion of the proposed remedial activities as described in the RAP/PMP. The Contractor shall coordinate and make all necessary arrangements for transportation and disposal of the material to the disposal facilities (disposal facilities are discussed in Section 804-2.10).

Excavated material may need to be temporarily stored in designated stockpile areas, and separate stockpiles for Contaminated Soil and potentially Clean Soil will need to be created and maintained as required. All soil piles will need to be covered with visqueen/plastic sheeting.

The Contractor will be responsible for preparation of and supplying all wastes manifests for Contaminated Soil disposed at the regulated facilities. Lead and petroleum impacted soils are currently anticipated to be removed from the Site as Non-Hazardous Waste. The Environmental Consultant will coordinate obtaining appropriate signatures for the waste manifests. The provisions specified in this section may be subject to alterations by the Environmental Consultant based on actual field conditions encountered during excavation activities.

A detailed description of the strategies for the export of Contaminated Soil from the Site is described in detail in Section 4.0 of the RAP/PMP.

703-2.5 Quality Assurance

Prior subsurface investigations have been completed at the Site and consisted of sampling and analytical testing of soil within the proposed limits of excavation. Such studies have provided data that may be utilized for the pre-profiling of some Contaminated Soil and for assessment of disposal options.

The Environmental Consultant will monitor the Contractor's activities associated with the work under this section on behalf of the Owner and will provide on-Site monitoring of all excavation activities to assess:

1. That Contaminated Soil is consistent with any pre-profiling assessment or if additional pre-profiling is required;
2. If the soil is not consistent with a pre-profiling assessment, that requirements for intermediate stockpile segregation and handling are met;
3. That stockpile disposition by category for off-Site disposal based on observations, field instrument screening, and testing by the Environmental Consultant is properly selected;
4. That appropriate destinations for pre-profiled or stockpiled soil are chosen and consistent with environmental laws and regulations.

The Contractor shall perform its excavation so as to segregate materials according to their classification determined by the pre-classification program or the Environmental Consultant's on-Site monitoring program as described in the RAP/PMP document. Great care must be taken by the Contractor to excavate Contaminated Soil at the Site in a manner that does not mix or commingle Contaminated Soil with non Contaminated Soil.

703-2. HEALTH AND SAFETY

703-2.6.1 Worker Health and Safety

Before project activities are initiated, the Contractor shall prepare a Site-specific Health and Safety Plan (HSP) in accordance with current statutes and regulations (e.g., 29 CFR 1910.120 and Title 8 CCR 5192). The intent of the HSP is to minimize, to the extent practicable, the exposure potential of workers and the public to chemical and physical hazards that could be encountered during project activities. The Contractor's HSP shall also apply to all persons on the project Site.

The HSP shall be consistent with anticipated work to be completed at the Site, which includes contaminated soil management as described in the RAP/PMP. A Certified Industrial Hygienist shall review, approve and sign the Contractor HSP. A copy of the approved HSP shall be provided to the Designated Owner's Representative and Environmental Consultant at least five working days prior to starting related fieldwork. The Contractor shall maintain a copy of the approved HSP at an accessible, on-Site location for the duration of the project.

The HSP shall identify potential exposure to Contaminated Soil, groundwater, vapors, and other potential chemical and physical occupational hazards that could be encountered during project activities. The HSP shall identify appropriate training, personal protective equipment (PPE), engineering controls, and monitoring, including medical monitoring, for Site workers.

The Contractor shall ensure that all workers who will or are likely to come in contact with contaminated substances or other potential chemical and physical occupational hazards are properly trained, with appropriate and current certifications, and are experienced in these types of situations as described in the RAP/PMP and as required by all applicable statutes, regulations and regulatory agency requirements. The Contractor shall be responsible for worker health and safety of the Contractor's employees, including medical monitoring, in accordance with the HSP, and as required by all applicable statutes, regulations, and regulatory agency requirements. The HSP shall have provisions to monitor project activities and Site conditions by a qualified Site Safety Manager retained/employed by the Contractor. The HSP shall be reviewed and understood by sub-contractors and others, as appropriate, prior to initiation of construction activities.

All Contractor personnel responsible for and involved in the implementation of the RAP/PMP and handling of all Contaminated Soil will be thoroughly knowledgeable and experienced in the various aspects of the work to be completed. This knowledge and experience will include, but not be limited to, excavation and handling of Contaminated Soils, working with Environmental Consultants in efforts to properly segregate Contaminated Soil from Clean Soil and minimizing commingling of contaminated and Clean Soil, Site physical conditions and access, Site personnel and contacts and Site health and safety rules, procedures, and protocols.

Site personnel who will work with Contaminated Soil will have 40-hour F Operations and Emergency Response (HAZWOPER) training and current 8-hour annual refresher training in accordance with 29 Code of Federal Regulations 1910.120 [Title 8 California Code of Regulations 5192]. Employees of the excavation, shoring and dewatering contractors retained for this project that will be in contact with or will handle Contaminated Soil via various pieces of equipment shall also have the proper 40-hour HAZWOPER training. In addition, the Contractor (or its subcontractors) who will handle Contaminated Soil shall hold a Class A, Engineering Contractor's license with a Hazardous Substance Removal Certification (HAZ) issued by the State of California.

703-2.6.2 Health and Safety Meetings

The Contractor shall conduct on-Site health and safety meetings according to the HSP. The Contractor shall keep a log documenting worker attendance at health and safety meetings. The log also shall include written confirmation, signed and dated by the Contractor's Site Safety Manager and each worker, as appropriate, indicating that the Contractor's Site Safety Manager has briefed all workers, and that each worker has read and understands the HSP, and agrees to abide by its provisions. The Contractor shall maintain a copy of the log on Site at all times and, with reasonable notice, make the log available for review by the Designated Owner's Representative or the Environmental Consultant.

Upon completion of the Contractor's work, the HSP Site meetings log shall be delivered to the Designated Owner's Representative or the Environmental Consultant for review. Final payment shall not be approved until a copy of the log is delivered to the Designated Owner's Representative.

703-2.6.3 Monitoring

The Contractor shall monitor and be responsible for all Site health and safety, including that of any sub-contractors, or others that may enter or work at the Site. The monitoring program shall be consistent with the requirements of Contractor's HSP and applicable portions of the Community HSP for the project which is included as an Appendix to the RAP/PMP.

703-2.6.4 Unforeseen Contamination/Conditions

If Contaminated Soil related conditions are encountered that are contrary to that described in the RAP/PMP and other environmental related documents, the Contractor will be directed by the Environmental Consultant to redirect or stop work, secure the area, notify the Contractor Site Safety Manager, or designee, and follow the appropriate procedures in the HSP, prepared by the Contractor.

If conditions are encountered that pose an immediate threat to human health or safety, such as potentially explosive or oxygen deficient atmospheres, the Contractor shall immediately stop, secure the area, call 911, as necessary, and immediately notify the Site Safety Manager, or designee. The Site Safety Manager shall immediately notify the Designated Owner's Representative or Environmental Consultant who will direct the Contractor to make further notifications. All oral notifications shall be followed up in writing within 24 hours.

In the event that an undocumented underground storage tank or tanks is/are located during the excavation, the Contractor shall cease excavation and shoring installation in that area immediately and notify the Designated Owner's Representative and Environmental Consultant. The Contractor shall relocate their operations to another portion of the project Site at no additional cost to the Owner while the Environmental Consultant secures permits for the tank(s) removal.

The Contractor and Site Safety Manager shall promptly evaluate previously unknown hazardous conditions and take appropriate corrective action regarding health and safety. The Contractor shall not be required to resume work in any such affected area until after the area has been rendered safe for the resumption of work, or the Site Safety Manager has specified any special conditions (e.g., Level "C" PPE) under which such work may be resumed safely.

703-2.6.5 Dispute

If the Contractor does not agree to resume work based on a reasonable belief that it is unsafe, or does not agree to resume work under special conditions (e.g., using specially trained and equipped personnel), then the Designated Owner's Representative, or Environmental Consultant, may order such portion of the work that is in connection with the hazardous condition, or the affected area, to be eliminated from the work. The Owner, through an appropriate new Contractor, may perform these eliminated portions of the work utilizing its own forces.

703-2.7 Execution

703-2.7.1 General Requirements

The Contractor shall notify the Designated Owner's Representative and Environmental Consultant, in writing at least 48 hours prior to excavating at the Site. This requirement is to ensure that Environmental Consultant is present at the Site during all excavation activities.

Construction workers, surrounding human populations, and environmental receptors shall be reasonably protected from exposure to hazardous materials during construction activities.

Contaminated Soil removed from the excavation and construction area shall be managed in compliance with the provisions of these special provisions, the RAP/PMP, and all applicable federal, state, and local laws.

It may be necessary for the Contractor, at the Environmental Consultant's direction, to perform test pitting of areas of the Site which were unexplored during previous investigation phases. This test pitting may happen routinely (daily) to explore areas to be excavated on subsequent days. There will be no additional payment by the Owner to the Contractor for exploratory test-pitting.

703-2.7.2 Excavation of Contaminated and Clean Soil

All Contaminated Soil, potentially Contaminated Soil and/or Clean Soil removed from the Site by the Contractor shall be conducted under the direction and oversight of the Designated Owner's Representative and Environmental Consultant. Worker and community health and safety, and procedures regarding the excavation, handling, transporting, and stockpiling of soil at the Site are described in the RAP/PMP document.

Contractor shall excavate materials by methods which will permit observation of exposed subsurface soils to identify, test, and segregate any soils/wastes and to eliminate the potential for mixing Contaminated Soils with non Contaminated Soils. As stated previously, great care must be taken by the Contractor to excavate Contaminated Soil at the Site in a manner that does not mix or commingle Contaminated Soil with non Contaminated Soil.

Excavation shall be performed in a controlled manner, and the excavation shall be limited in depth and area, such that to the extent feasible, they do not result in cross-contamination of Contaminated from Clean Soil, nor result in any material being re-profiled as a result of mixing with other materials during excavation and handling.

Contaminated Soil shall be segregated and loaded separately in accordance with direction to be provided by the Environmental Consultant and as described in the RAP/PMP document. Additional segregation may be required during excavation based on field screening, analytical testing and visual and odor criteria. The Contractor will be responsible for the proper on-Site management of this material per the direction of the Environmental Consultant.

The Contractor will be responsible for cleaning of vehicles before they leave the Site, protecting for dust or other soil loss during over-road transport and transporting Contaminated Soil to its final destination.

Soil sampling performed by the Environmental Consultant on behalf of the Owner will be performed on Site at a frequency that will be partially dependent on the Contractor's excavation and/or stockpiling rate. Receipt of analytical testing results will vary from 24 hours to four working days. The Environmental Consultant will select appropriate analytical laboratory turn-around times in efforts to keep the mass excavation moving at an appropriate rate. There will be no additional payment by the Owner to the Contractor for potential down time that may result from pending analytical laboratory data.

Based on the space available on-Site for stockpiling and the amount of soil to be excavated, the Contractor's stockpiling and staging areas are a part of their means and methods and not at the direction of the Owner or the Environmental Consultant. Clean soil is to be exported from the Site by the contractor to off-Site receiving facilities for use a fill material. The Contractor will be responsible for providing the Environmental Consultant copies of trucking logs or bills of lading for Clean Soil. Such documentation is to be scanned and provided to the Designated Owner's Representative and Environmental Consultant electronically on a CD-ROM. Such information will also be utilized by the Environmental Consultant for the purposes of Clean Soil tracking under SD-RWQCB Resolution R9-2014-0041 (Conditional Waiver No. 10) and for use in drafting the closure report for the project. Clean Soil can also be re-used on Site (if required). No additional payment for double/multiple handling of excavated material will be allowed.

703-2.7.3 Field Soil Quality Monitoring

All excavated soils will be monitored by the Environmental Consultant to evaluate consistency with any pre-profiling test data. Soils will be evaluated based on the following: visual inspection for soil staining; detection of a petroleum-like odor from exposed soil; elevated concentrations of VOCs using a photoionization detector (PID), detection of elevated concentrations of specific compounds such as lead, petroleum hydrocarbons or VOCs via on-Site or off-Site analytical laboratory testing and other indicators of possible contamination. Field characterization of the soil will be the responsibility of the Environmental Consultant.

703-2.7.4 Soil/Excavated Contaminated Material Stockpiling

Excavated Contaminated Soil and Clean Soil requiring temporary stockpiling shall be placed in intermediate areas located on-Site. The temporary stockpiles shall be located on-Site and away from the on-going construction activity to the extent practicable, pending the results of the screening or laboratory analyses if required. Once the material is classified based on the results of laboratory analysis and/or field screening by Environmental Consultant, it shall either be removed from the Site under an appropriate manifest or used as backfill on-Site (only if required per the construction plans) as directed by the Environmental Consultant. Intermediate stockpiles of contaminated and Clean Soil shall be placed on 6 mil polyethylene plastic and securely covered with polyethylene provided by the Contractor.

703-2.8 Characterization for Off-Site Disposal

Soil within the proposed limits of excavation has been pre-characterized by the Environmental Consultant to the extent feasible and based on available analytical data generated during prior subsurface investigations. Additional characterization may be completed by the Environmental Consultant via field soil quality monitoring. The types and frequency of testing will be determined by the Environmental Consultant and are outlined in the RAP/PMP document.

As stated previously, it will likely be necessary for the Contractor, at the Environmental Consultant's direction to perform test pitting of areas of the Site which were unexplored during the investigation phase. This test pitting may happen routinely (daily) to explore areas to be excavated on subsequent days.

703-2.9 Waste Manifesting Process

All soil from the Site that is transported to off-Site disposal facilities will be done so under proper manifesting protocol to track the movement of Contaminated Soil from the point of generation to the final disposal point. Contaminated Soil will be tracked under a Non-Hazardous Waste manifest. It is not anticipated that Non-RCRA Hazardous Waste or RCRA Hazardous Waste will be generated during the course of the project. However, in the event that such waste is encountered during the course of the project and profiled as such by the Environmental Consultant, it will be tracked via the uniform hazardous waste manifest and delivered to appropriate receiving facilities. The Contractor will maintain one copy of all waste manifests on-Site. As stated previously, documentation of the disposition of Clean Soil that is exported from the Site will be done so via trucking logs or bills of lading.

The Contractor shall provide all non-hazardous and uniform hazardous waste manifests (if required) for the project. Information to be included on the manifests will include:

1. The name, address and phone number of the transporter;
2. The name and address of the receiving facility;
3. Any applicable California Environmental Protection Agency Identification Numbers;
4. Proper waste codes; and
5. Other pertinent information that may be required.

If required, the Environmental Consultant will procure a California Environmental Protection Agency Identification Number on behalf of the City or Owner and provide the number to the Contractor for use when printing uniform hazardous waste manifests. The Environmental Consultant will also provide other necessary information as needed. The Contractor will be responsible for any penalties levied by the California Department of Toxic Substances Control (DTSC) for incorrect information (including waste codes) printed on uniform hazardous waste manifests that are utilized at the Site.

Drivers of trucks that transport Hazardous Waste from the Site must operate under a valid California EPA Identification Number.

703-2.10 **Transportation and Disposal of Excavated Material**

The Contractor shall not remove Contaminated Soil from the Site without approval of the Environmental Consultant. All waste that is removed from the Site will be shipped under the manifesting protocol referenced in Section 804.2-9. The Environmental Consultant shall coordinate obtaining appropriate signatures for all waste manifests.

The Contractor is responsible for loading and transporting all Contaminated Soils to appropriate disposal facilities as discussed below.

Soil removed from the Site shall be loaded within the Site limits. All trucks leaving the Site shall be covered and cleaned of spilled debris that might fall from the trucks during transport. Every attempt shall be made to prevent debris from being spilled from trucks or tracked from the Site onto local streets. Each work day the Contractor shall clean local streets which contain Site debris and comply with any other local requirements and the Stormwater Pollution Prevention Plan (SWPPP) or related document for the project. If necessary, the truck beds will be lined with 6-mil polyethylene sheeting to prevent petroleum contaminated liquids (if saturated soil is encountered) from leaking from the truck. The Contractor will be responsible for lining the trucks at the discretion of the Environmental Consultant.

Contaminated Soil leaving the Site shall be delivered to the disposal facility within the same day as manifested.

Information pertaining to the required licensing and insurance requirements for trucking companies who will be transporting Contaminated Soil is included in Section 7 of these Special Provisions

The Contractor shall transport all Contaminated Soils to appropriate disposal facilities. All disposal facilities that receive Contaminated Soils from the project Site must be permitted by all appropriate federal, state, and local regulatory agencies to receive petroleum impacted soils or other waste soils that are classified as non-hazardous and/or Non-RCRA Hazardous Waste in California and all permits must be in good standing. The disposal facility should also carry commercial general liability insurance, on-Site premises pollution liability insurance, off-Site premises pollution liability insurance, and third-party pollution liability insurance in the amount of at least \$5 million, or be able to demonstrate financial assurance of assets of these amounts set aside specifically for these categories. In addition, disposal facilities that receive Contaminated Soils from the project Site should use appropriate waste acceptance and profiling requirements, have qualified personnel reviewing the waste profile and analytical data, and mechanisms at the facilities to trace the placement of waste. After evaluating these criteria, the following facilities are considered to be acceptable disposal facilities for Contaminated Soil for this project: Otay Landfill in Chula Vista, California and Clean Harbors Buttonwillow in Buttonwillow, California. As stated previously, contaminated soil to be removed from the Site during the course of the project is anticipated to be profiled and removed as Non-Hazardous Waste.

The Environmental Consultant will have the responsibility to test the Contaminated Soil and will communicate to the Contractor which facilities (out of the two facilities identified immediately above) can receive the Contaminated Soil based on the level

and type of contamination. The Contractor will then identify the facility to receive the Contaminated Soil and will be responsible for obtaining the necessary manifests. The Environmental Consultant will then complete the necessary waste profiling for the selected disposal facility. However, once the Environmental Consultant completes the necessary waste profiling, the Contractor is solely responsible for proper and legal transport of all Contaminated Soil removed from the Site. Copies of all records of shipment and disposal shall be provided to the Designated Owner's Representative. The Designated Owner's Representative's receipt of or comment on such information shall in no way relieve the Contractor of its sole responsibility.

The Environmental Consultant will also have the responsibility to test Clean Soil to be removed from the Site. Available analytical laboratory data pertaining to Clean Soil will be provided to the Contractor by the Environmental Consultant. The Contractor may provide such data to potential receiving facilities of the Clean Soil in addition to the published environmental documents pertaining to the Site (see Section 804.2.1) as part of their evaluation of the suitability of the reuse of such soil at their facilities/properties. The Environmental Consultant will also provide the Notice of Intent document required under SD-RWQCB Resolution R9-2014-0041 (Conditional Waiver No. 10) to the Contractor. No additional documents, including letters, written certifications, etc. pertaining to Clean Soil to be exported from the Site will be generated by the Environmental Consultant or the Owner.

Receiving facilities that may reuse Clean Soil generated from the Site may also sample and test such soil at their sole cost as part of evaluating it for reuse. Prior to any third party entering the Site for such sampling, permission to enter the premises must be granted by the Contractor and the Designated Owner's Representative.

The Project does not expect to require import soil; however, if any soil is to be imported, it must be Clean Soil.

703-2.11

Contingencies

If during the work, the presence of potentially hazardous conditions is evident, work in the area may be terminated at the discretion of the Environmental Consultant. These conditions include, but are not limited to, encountering unknown buried containers, drums or unforeseen/unanticipated tanks.

The area will be secured to prevent the existence of a health risk or release into the environment. The sources of the event causing the material to be considered suspect will be evaluated by the Environmental Consultant. In the event that unknown buried containers, drums or tanks are encountered or if a release of oil or potentially hazardous materials has occurred, the Contractor shall notify the Environmental Consultant immediately. The County of San Diego DEH and San Diego Fire Department, must also be notified prior to removal of unknown buried storage tanks. Such notifications will be made by the Environmental Consultant.

Should any sudden, continuous or intermittent release of oil or hazardous material occur during the course of the work, the Contractor shall notify the Environmental Consultant immediately and shall immediately begin actions to contain and abate the release. The Contractor shall immediately arrange for clean-up activities.

The use of aeration equipment, including fans for removing petroleum vapors from the excavation area is not expected to be required. However, in the event that such a condition arises, the Contractor will be responsible for supplying aeration equipment at the Site. The Environmental Consultant will screen organic vapors in the excavation areas using a PID, however Contractor will be responsible for requiring appropriate PPE for its workers during the course of the project and may rely on the Environmental Consultant's PID screening data and associated measured levels of organic vapors at their own discretion.

As stated previously, contaminated soil to be removed from the Site during the course of the project is anticipated to be profiled and removed as Non-Hazardous Waste and the Base Contract Bid Price is to be based on such an assumption. Any discussion of Non-RCRA Hazardous Waste in the bid documents is included for contingency related purposes only.

703-2.12 Measurement and Payment

Based on actual Site conditions, the Designated Owner's Representative and Environmental Consultant will direct the Contractor to excavate, segregate, load, transport, and dispose Contaminated Soil at the disposal facilities agreed upon by the Environmental Consultant and the Contractor in accordance with Section 804-2.10. The Designated Owner's Representative, or the Environmental Consultant will sign the applicable waste manifests prior to transporting any Contaminated Soil. Unless otherwise directed by the Designated Owner's Representative and the Environmental Consultant, notification of the off-Site transportation date shall be submitted to the Designated Owner's Representative and the Environmental Consultant 48 hours in advance of the transportation date. An appropriate waste manifest(s), certificate(s) of disposal, or other certified records shall be provided to Designated Owner's Representative or the Environmental Consultant in accordance with these specifications for all material transported off-Site. Final payment shall not be approved until a copy of all waste manifests, certificates of disposal, or other certified records is delivered to the Owner. The Designated Owner's Representative or the Environmental Consultant as an agent for the Owner will be responsible for signing the waste manifests.

Payment for excavation, segregation, loading, transportation, disposal, and associated landfill and disposal fees (Remedial Excavation) and other work incidental to removal of Contaminated Soil from the Site that is required of the Contractor per the standard specifications and these special specifications shall be as specified in the bid documents and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for completing all work involved in the excavation, segregation, loading, transportation, and disposal of the Contaminated Soil including all associated costs and fees as defined in these specifications. Such compensation will be tracked as a single unit cost per ton for all work described in this specification, including transportation and disposal of Contaminated Soil as a non-hazardous waste.

The Environmental Consultant will be responsible for all waste profiling, analytical laboratory testing of Site soils, field screening, sample tracking and regulatory reporting (including a Site Closure Report). In addition, no separate measurement or payment will be made for on-Site handling, rehandling, reuse, filling, management, stockpiling, equipment, surveying, or other associated items or work considered incidental to the conduct of the Base Contract Bid Price.

SECTION 705 – WATER DISCHARGES

705-1 HYDROSTATIC DISCHARGE REQUIREMENTS. To the City Supplement, ADD the following:

3. The discharge of hydrostatic test water and/or potable water shall not contain constituents in excess of the following:

Table 705-1 (A) Effluent Limitations

Parameter	Units	Effluent Limitations
Total Residual Chlorine	mg/L	0.1
pH	units	Within the limits of 6.0 and 9.0 at all times

4. Compliance with the effluent limitation shown in Table 705-1 (A) shall be determined based on the 90th percentile of all samples obtained during the discharge event. Non-compliance for each event will be considered separately.
5. Groundwater underlying the Fire Station No. 2 (Bayside) property has been impacted with petroleum hydrocarbons and potentially with other contaminants and/or hazardous substances and will require treatment following extraction and prior to discharge from the property. The Contractor shall provide all labor, equipment, materials, analytical laboratory testing and incidentals to perform site dewatering necessary to lower and control groundwater levels and hydrostatic pressures to allow excavation and construction to be performed at the property under dry conditions. Dewatering operations shall be adequate to assure the integrity of the finished product. Regarding the treatment and subsequent discharge of extracted groundwater, the Contractor shall maintain full compliance with San Diego Regional Water Quality Control Board (SD-RWQCB) Orders, National Pollutant Discharge Elimination System (NPDES) permitting requirements, Waste Discharge Requirements and any other applicable regulations and also The City of San Diego Metropolitan Wastewater Department Industrial Wastewater Control Program Policy For Groundwater Discharges to Sewer, as applicable. Any fines, penalties or other actions resulting from non-compliance with regulatory requirements during the dewatering activities shall be the sole responsibility of the Contractor.
6. Performance of dewatered groundwater treatment, discharge and reporting is to be all inclusive of all items and tasks under applicable SD-RWQCB and/or City of San Diego requirements, including but not limited to, sampling and analysis of groundwater as part of permit/application processing, permit/application preparation (i.e. Form 200 or other documents as required), half-mile radius study and Professional Engineer signature, Notice of Intent (NOI) preparation, any and all application fees and renewal fees to be paid to the SD-RWQCB or City of San Diego Metropolitan Wastewater Department as required, mobilization and demobilization of equipment and treatment media, operations of maintenance of the treatment system, monthly groundwater sampling, laboratory

analysis and required report submittals, Notice of Termination (NOT) preparation and any other activities typically conducted during dewatering activities for similar projects. In the event that rain events occur during the excavation work resulting in additional waters to be extracted, treatment and discharged from the property, such waters shall be managed in a similar manner to extracted groundwater as described above. There will be no additional payment to the Contractor by the Owner for extraction, treatment and discharge of surface water that enters the property during the construction activities.

7. All application, permitting and other related work shall be completed by the Contractor in a timely manner and shall not cause delay for the project. The Environmental Consultant will assist the Contractor in coordinating the signing of applicable sections of documents requiring signature by appropriate persons.

705-2.2 Permits. To the City Supplement, ADD the following:

The contractor shall provide copies of all RWQCB and Metropolitan Wasterwater dewatering permits to the City Inspector to remove all holds from the building permit.

705-2.6.1 General. Paragraph (3), CORRECT reference to Section 803 to read "Section 703."

705-2.6.3 Community Health and Safety Plan. To the City Supplement, DELETE in its entirety and SUBSTITUTE with the following:

705-2.6.3 Community Health and Safety Plan. See 703-2, "Community Health and Safety Plan."

SECTION 707 – RESOURCE DISCOVERIES

ADD:

707-1.1 Environmental Document. The City of San Diego Environmental Analysis Section (EAS) of the Development Services Department has prepared an Environmental Secondary Study for the Fire Station No.2 (Bayside) as referenced in the Contract Appendix. You must comply with all requirements of the Environmental Secondary Study as set forth in the Contract Appendix G

Compliance with the City's environmental document is included in the various Bid items, unless a bid item has been provided.

707-2 Archeological and Native American Monitoring Program. To the City Supplement, ADD the following:

The Successor Agency will retain a qualified archaeologist for this contract. The Contractor shall coordinate its activities and Schedule with the activities and schedules of the archaeologist monitor. Notify the Engineer before noon of the working day before monitoring is required. See 2-11, "INSPECTION" for details.

707-3 Paleontological Monitoring Program. To the City Supplement, ADD the following:

The Successor Agency will retain a qualified paleontologist for this contract. Coordinate its activities and Schedule with the activities and schedules of the paleontologist monitor. Notify the Engineer before noon of the working day before monitoring is required. See 2-11, "INSPECTION" for details.

END OF SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

TECHNICALS

PROJECT MANUAL

August 12, 2015

FIRE STATION NO. 2 (BAYSIDE) CITY OF SAN DIEGO San Diego, California

buildingSMARTalliance®

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San Diego, California 92101

Telephone: 619-232-0888

Fire Station No. 2 (Bayside)

Attachment E - Technicals

Volume 1 of 2 (Rev. July 2015)

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USER GUIDE FOR THE PROJECT MANUAL

00 01 08

1. SUMMARY:

- A. GENERAL: This Guide is provided as a basis for understanding the organization and use of this Project Manual.
- B. DEFINITIONS:
 - 1. Construction Documents: Defined as the written and graphic documents prepared or assembled by the Architect for communicating the design of the project and administering the contract for its construction. These include the Procurement Requirements (Advertisement for Bids, Instructions to Bidders, and Bid Forms) and the Contract Documents.
 - 2. Contract Documents: Defined as the legally enforceable requirements that become part of the contract when the agreement is signed, these include the Contract Forms, Conditions of the Contract, Specifications, Drawings, Addenda, and Contract Modifications. They describe the proposed construction (referred to as the "Work") that results from performing services, furnishing labor, and supplying and incorporating materials and equipment into the construction.
 - 3. Contract Forms: Include the agreement, bonds and certificates.
 - 4. Conditions of the Contract: Define the basic rights, responsibilities, and relationships of the parties involved in the construction process.
 - 5. Specifications: Divided into 50 Divisions, the Specifications define the qualitative requirements for products, materials, and systems and the standards of workmanship required for installation. Division 01 sections constitute the GENERAL REQUIREMENTS necessary for the Project; Divisions 02 through 49 comprise the Technical Specifications portion of the Project Manual.
 - 6. Drawings: Graphic representations of the Work, which show the materials and their relationships to one another, including sizes, shapes, fit, location, and connections.
 - 7. Addenda: Written or graphic documents issued to clarify, revise, add to, or delete information in the original bidding documents or in previous addenda.
 - 8. Contract Modifications: Written instruments used to add to, delete from or otherwise modify the Work after the construction agreement has been signed.
- C. DIVISION 01 - GENERAL REQUIREMENTS: Division 01 of the Specifications expands on certain of the broad provisions of the Conditions of the Contract and governs the execution of all Technical Sections of the Specifications. Sections included in Division 01 specify the administrative and procedural requirements, as well as temporary facilities, required for the Project. All requirements stated in Division 01 apply to and will be in force for all subsequent Sections included in Divisions 02 through 49.
- D. PRODUCT REFERENCES: Specification Section numbers and titles follow the latest recommendations of MasterFormat™ 2010 Edition published by the Construction Specifications Institute (CSI). The Section titles represent work results and may be stated in the singular or plural without regard to the actual quantity used on the project. The organization of specifications by Section is not meant to define subcontracts or other divisions of work by trades.
- E. MANUAL FORMAT:
 - 1. General: The first page of each Section is graphically defined with very large and boldfaced Section number and title. Succeeding pages of each Section are printed back-to-back, with header in normal-sized type that has the Section name and number and page number appearing in the upper right-hand corner of the page.
 - 2. Underlined and Boldface Type: Underlining and bolding have been used in different combinations throughout the Project Manual to highlight headings and significant text. These devices have been used to assist the user in finding items of information or to emphasize the importance of certain information. No other meaning is attached to the use of boldface and underlined text.
 - 3. Dates: The official date of issue of the Project Manual appears on the cover sheet of this Project Manual. Dates subsequent to that date on individual Section pages indicate reissue of entire Sections for clarification.

1.2 DEFINITIONS AND INTERPRETATIONS:

- A. WORDS AND TERMS: Those which are frequently used, with special meanings, in this Project Manual are defined in Section 01 42 00 - REFERENCES.
- B. GOVERNING DICTIONARY: The definitions of words used in these Specifications, which are not defined in Section 01 42 00 - REFERENCES, the General Conditions, or in referenced standards, are as given in "The American Heritage Dictionary of the English Language".

- C. **SPECIFICATION LANGUAGE:** These Specifications are written in the imperative mood, as defined in the Construction Specifications Institute's Project Delivery Practice Guide. Imperative language is directed to the Contractor. The indicative mood is employed on occasion when such sentence structure is necessary to convey the intended meaning in a more accurate or understandable form. The text is streamlined, with the colon (:) employed as a symbol for the words "shall be", "shall have", "shall conform with", "shall comply with", or "shall meet the requirements of". The colon is also used to separate a paragraph title or heading from the text that follows.

* * *

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* End 00 01 10 *

Division 01 - GENERAL REQUIREMENTS

SUMMARY OF WORK

Section 01 01 50

1. GENERAL:

- A. THE PROJECT: The name of the Project is Fire Station No. 2 (Bayside). The project site is located at 1595 Pacific Highway, San Diego, CA 92101.
- B. RESPONSIBLE PARTIES: Construction of this Project is governed by the agreement between the City Representative and the Contractor. Statements in the specifications are directed to this contractor, who has overall responsibility for the subcontractors.
- C. WORK COVERED BY THE CONTRACT DOCUMENTS:
 - 1. General: Under a single contract demolish an existing one-story restaurant and construct a new three-story Fire Station with one level of underground parking, in conformance with Drawings and Specifications prepared by Rob Wellington Quigley, FAIA, Architects, San Diego, CA, and bound herewith.
- D. REQUIREMENTS:
 - 1. Requirements for Sequencing or Scheduling:
 - a. General: Begin work as identified in the Construction Contract, proceed as shown in the Progress Schedule as required under Section 01 32 14 - PROGRESS SCHEDULE, and complete work within the limits designated in the Construction Contract.
 - b. Schedule of Work: Coordinate work to accommodate the City's operations and use of premises during construction period; coordinate construction schedule and operations with City's Representative; indicate all special requirements in the Progress Schedule as specified.
 - 2. City-furnished, Owner-installed Items:
 - 3. City-furnished, Contractor-installed Items: Included are residential appliances. Refer to Section 01 64 00 - OWNER FURNISHED PRODUCTS.

2. PRODUCTS:

- A. HAZARDOUS MATERIALS:
 - 1. General: No asbestos or products containing asbestos have been knowingly specified for this Project.
 - 2. Notification: If materials containing asbestos are brought to the site for use or installation in the Work; or if such materials are encountered in existing work upon which new work is being performed, notify the City's Representative immediately so that appropriate action may be taken.
 - 3. Certification: A statement certifying that no new materials containing asbestos have been included in the Work is required at the completion of the Project.

3. EXECUTION:

- A. CONTRACTOR'S USE OF PREMISES:
 - 1. General: Confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents; do not unreasonably encumber the site with materials or equipment.
 - 2. Coordination with Occupants: Do not interfere with City's activities in and about existing facilities. Disruption of City's operations will be acceptable only with prior agreement with the City Representative. Ten (10) days minimum notice will be required, including establishment of a firm schedule for operations.
 - 3. Access to Site: Roads for access to and from building site, loading areas and parking space shall be as indicated. Confine traffic and materials delivery to these roads and locations.
 - 4. Storage: Contractor is responsible for protection and safekeeping of products stored on the site. Specific areas for storage of materials and site fabrication shall be as indicated by the City's Representative.
- B. PROTECTION: Erect temporary barricades, warning signs and substantial handrails to protect persons in and around the work areas and observe safety precautions. Conform to applicable OSHA rules and regulations and State Safety Regulations and Orders.

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MEASUREMENT AND PAYMENT

Section 01 02 50

1. GENERAL:

A. DESCRIPTION:

1. This section defines the Lump Sum Prices and Allowances listed in the Bid Schedule, and the manner in which they will be used to determine measurement and payment for all items included in the Bid Schedule. Parts 2 and 3 of this section describe the procedures required to be followed for monthly progress payments to the CONTRACTOR.
2. Payment for all items of the Bid Schedule whether lump sum or unit price shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of WORK being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs shall be included in the prices named in the Bid Schedule for the various items of WORK.
3. Monthly pay requests are due on the 6th of each month, and while pay requests will be accepted prior to this date, pay request processing will not begin until this date for purposes of meeting the City's pay request processing obligations under the California Public Contract Code. Failure of the CONTRACTOR to submit his pay request by this day may be cause for the rejection of the pay request. If rejected, the CONTRACTOR may have to resubmit his pay request the next month. Should the submittal date fall on a holiday or weekend day during the month then the CONTRACTOR shall consider the next working day as the due date.

B. BID PROPOSAL:

1. Lump Sum Prices: The CONTRACTOR shall provide Lump Sum Prices in the Bid Schedule for all WORK in the Contract Documents, except items of WORK listed in the Contract as Unit Priced Items. For Lump Sum items, only the total amount need be filled in.
2. Allowance Items: Allowance Item amounts are provided by the CITY to cover the cost of additive WORK not presently identified in the Contract Documents. Payment for Allowance Items will be made only when authorized as described in Part 1.C, below.
3. Retention: Payment for all bid items is subject to the retention provisions of the General Conditions.
4. Schedule: All scoped Allowance Bid Items and Unit Priced Bid Items are included in the scope of the Contract without specific locations for the WORK provided. The CITY reserves the right to direct that these scoped items of WORK be performed when they are encountered, and the CONTRACTOR is obligated to accommodate this WORK within the original contract duration. The CONTRACTOR will not be entitled to additional time regardless of where the WORK is encountered.
5. Quantities for each item in the Bid Schedule will be used to analyze the bids and determine contract award.
6. Specified Items and Stipulated Prices: The stipulated price for these items cannot be invoiced until the item is complete and accepted by the CITY REPRESENTATIVE.

C. MEASUREMENT AND PAYMENT:

1. General: This article defines the manner and method to develop the Lump Sum and Allowance bid amounts of all items identified in the Bid Schedule. Bid amounts will include all plant, equipment, tools materials, labor, service, and all other items required to complete the WORK included in the Contract unless specifically excluded by this section. WORK required for which no separate bid item is identified will be considered as a subsidiary obligation of the CONTRACTOR, and the cost therefore shall be included in the most applicable bid item. Compensation for completion of the WORK will be determined by use of the cost loaded CPM schedule. Bid amounts for each item will be the basis for development of budget values for activities included in the cost loaded CPM schedule as described in the Contract Documents. Allowance Bid Item amounts will also be adjusted by a Change Order to the contract amount when WORK is completed, and actual authorized quantities and Allowance amounts are established.
2. Contract-Required WORK:
 - a. Bid Item No. 1 - Mobilization (Lump Sum): Refer to City Supplement section 9-3.4.1.
 - b. Bid Item No. 2 - Survey Services (Lump Sum): Refer to City Supplement section 2-9.2.
 - c. Bid Item No. 3 - Bonds (Payment and Performance) (Lump Sum):
 1. General: Refer to the GREENBOOK and City Supplement section 2-4.1.

- d. Bid Item No. 4 - Water Pollution Control Program Development (Lump Sum): Refer to City Supplement section 701-13.9.5.
 - e. Bid Item No. 5 - Water Pollution Control Program Implementation (Lump Sum): Refer to City Supplement section 701-13.9.5.
 - f. Bid Item No. 6 – Permit Fees (Allowance):
 - 1. General: Refer to City Supplement section 7-5.3.
 - 2. Description: Permits Fees for City of San Diego (California OSHA Site Specific Permit Fees and Groundwater Discharge Permit Fees)
 - 3. Allowance Amount: Unit price \$50,000.00; extension \$50,000.00.
 - g. Bid Item No. 7 – Permit Fees (Allowance):
 - 1. General: Refer to 10250.
 - 2. Description: SDG&E Service Fee, Dry Utilities Connections, Pac Bell, AT&T and Time Warner-Type I allowance.
 - 3. Allowance Amount: Unit price \$50,000.00; extension \$50,000.00.
 - h. Bid Item No. 8 - Demolition/Existing Conditions at 1595 Pacific Highway, San Diego, CA 92101(Lump Sum): Refer to 10250.
 - i. Bid Item No. 9 - Construction of Fire Station No. 2 and Related Site Improvements along Pacific Highway. (Lump Sum): Refer to 10250.
 - j. Bid Item No. 10 - Excavation, Segregation, Loading, Transportation, and Disposal of Non-Hazardous Waste Soils Containing Lead and/or Petroleum Hydrocarbons: Refer to City Supplement section 703-20.
 - k. Bid Item No. 11 - Furniture, Fixtures and Equipment that includes a fire truck (Allowance):
 - 1. General: No measurement will be made for this item. Payment for WORK under this bid item will be made only to the extent that such WORK is specifically authorized in advance by the CITY REPRESENTATIVE.
Prices for this work will be negotiated. This item is considered incidental to the Contract and may be adjusted or deleted in its entirety. Refer to 10250.
 - 2. Allowance Amount: Unit price \$1,500,000.00; extension \$1,500,000.00
 - l. Bid Item No. 12 – Field Orders - Type II - Allowance:
 - 1. General: Refer to City Supplement section 9-3.5.
 - 2. Allowance Amount: Unit Price \$200,000.00; extension \$200,000.00
3. Additive Alternate A: Cedar Street AC paving replacement (Lump Sum); refer to 302-5.9.

2. PRODUCTS:

A. GENERAL PROGRESS PAYMENT REQUIREMENTS:

- 1. Payment for WORK performed shall be in accordance with the Cost Loaded CPM. The RESIDENT ENGINEER will verify measurements and quantities. Each activity necessary to manage and complete the WORK is identified on the contract schedules. Each activity will be assigned its respective value, a portion of the contract price, as shown on the Summary of Values.
- 2. Payment for all lump sum costs and services incurred on this Contract shall be based on the earned value of WORK accomplished during the reporting period. Earned value is determined by the completion percentage of each activity applied to the total value of the activity. No construction activity shall be deemed 100% complete until the CONTRACTOR has completed the physical check out and inspection of the completed WORK and has submitted the signed inspection form to the CITY REPRESENTATIVE.
- 3. Unit price items will be paid based on quantities (or equivalent quantities) installed.
- 4. Earned value is derived from the current status of the CONTRACTOR Construction Schedule as determined by the monthly schedule status submittals. Each schedule status submittal is reviewed and approved by the CITY REPRESENTATIVE prior to the CONTRACTOR obtaining approval for the Summary of Earned Values or quantities installed and the Application for Payment.
- 5. The CONTRACTOR shall not take advantage of any apparent error or omission on the Drawings or Specifications, and the CITY REPRESENTATIVE shall be permitted to make corrections and interpretations as may be deemed necessary for fulfillment of the intent of the Contract Documents at no additional cost to the CITY.
- 6. The retainage specified in the contract shall apply to all payments to the CONTRACTOR including permits and mobilization.

B. APPLICATION FOR PAYMENT:

- 1. Application for payment shall be on the CITY's form provided by the CITY REPRESENTATIVE and certified by signature of an Authorized Officer of the CONTRACTOR. Three (3) copies of the application for payment shall be submitted. Application shall be made monthly.
- 2. The Application for Payment contains all necessary references and attachments that substantiate the invoice for progress payment, (e.g., certified payrolls, labor reports, progress schedule data, and Summary of Earned Values). It must be preceded or accompanied by schedule and status data in accordance with the Contract Document provisions.

3. The Application for Payment is submitted according to the format and instructions provided by the CITY and covering the WORK completed through the last day of the previous month or through the date established by the CITY REPRESENTATIVE.

3. EXECUTION:

A. MONTHLY REVIEWS/APPLICATION FOR PAYMENT:

1. Monthly review meetings between the CONTRACTOR and the CITY REPRESENTATIVE will be held within 7 days prior to the payment application date designated by the CITY REPRESENTATIVE. Prior to the monthly review meeting, the CONTRACTOR will submit the Master Record Documents as identified in the Contract Document provisions, an updated schedule and a signed application for payment showing a Summary of Earned Values for the reporting and payment period so that the CITY REPRESENTATIVE can compare earned values to available status data. The CONTRACTOR shall make any adjustments to the Master Record Documents, updated schedule, and payment applications deemed necessary. Upon completion of the adjustments the CITY REPRESENTATIVE will sign the payment request and forward it to the CITY. The CITY REPRESENTATIVE will determine payment amounts if agreement with the CONTRACTOR is not reached.

B. PAYMENT FOR PRODUCTS STORED ON SITE:

1. Refer to City Supplement section 9-3.3.1.1.
2. The CONTRACTOR may request payment for products (material and/or equipment) which will be incorporated into the WORK and which are delivered and stored on-site. Payments for products stored at the site shall be based upon the cost of all acceptable materials and equipment not incorporated in the WORK but delivered and suitably stored at the site; provided each such individual item has a value of more than \$5000 and will become a permanent part of the WORK. The Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the CONTRACTOR has received the materials and equipment free and clear of all liens, charges, secured interests, and encumbrances and evidence that the materials and equipment are covered by appropriate property insurance as specified in the insurance provisions and other arrangements to protect the CITY'S interest.

C. PARTIAL PAYMENTS FOR MATERIALS STORED OFF SITE:

1. Refer to City Supplement section 9-3.3.1.2.
2. The CONTRACTOR may request partial payment for Products (material and/or equipment), which will be incorporated into the WORK and which are delivered and stored off-site. Any payments approved pursuant to this sub-section shall not exceed sixty-five percent (65%) of the Product's invoiced value and shall be subject to retainage as set forth in the General Conditions. The CITY reserves the right to refuse approval for payment for any Equipment or Materials suitably stored off-site in its sole discretion, regardless of whether all conditions contained herein have been met.
3. Partial payment may be made for Products eligible for off-site delivery and storage only upon presentation by the CONTRACTOR of a Bill of Sale, an Invoice or an Affidavit certifying that the material is received by the CONTRACTOR free and clear of all liens, encumbrances and secured interests of any kind, and including, for off-site delivery, evidence acceptable to the CITY that "all-risks" property insurance in an amount sufficient to protect the interests of the CITY is in effect at the approved site, and that the CITY is a loss payee and an additional insured.
4. Partial payment for Products delivered and stored off-site shall be contingent upon CONTRACTOR'S compliance with the storage and protective maintenance requirements set forth in the Contract Document provisions and all other requirements necessary to preserve equipment warranties for the benefit of the CITY.
5. All costs associated with delivery to and storage at an off-site facility shall be assumed by the CONTRACTOR notwithstanding the CONTRACTOR'S request for and the obtaining from the CITY approval to so deliver and store the materials.
6. Refer to City Supplement section 9-3.3.1.2.
7. CONTRACTOR must provide the CITY, upon request and prior to any partial payment, documentation which transfers absolute legal title to such materials to the CITY conditional only upon receipt of final payment. Neither such transfer of title nor any partial payment shall constitute acceptance by the CITY of the materials, nor void the right to reject materials subsequently found to be unsatisfactory, or in any way relieve the CONTRACTOR of any obligation arising under the Contract Documents.

* * *

SUBSTITUTION PROCEDURES

Section 01 25 00

1. GENERAL:

- A. **SUMMARY:** This Section includes administrative and procedural requirements for handling requests for substitutions.
 - 1. **Definitions:**
 - a. **General:** Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
 - b. **Substitutions:** Changes in products, materials, equipment, and methods of construction required by the Contract Documents that are proposed by the Contractor after award of the Contract are considered to be requests for substitutions.
- B. **PRODUCT OPTIONS:** Refer to Section 01 60 00 - PRODUCT REQUIREMENTS.
- C. **SUBMITTALS:**
 - 1. **Products List:** Include products for which Contractor proposes a substitution in the Products List submitted under Section 01 60 00 - PRODUCT REQUIREMENTS.
 - 2. **Substitutions:**
 - a. **General:** For any request for "accepted equal" or substitution, submit one (1) electronic copy (PDF) of completed and signed Substitution Request with required substantiating data in accordance with Supplementary Special Provisions, Paragraph 4-1.6 Trade Names or Equals.
 - b. **Substantiating Data:**
 - 1. **Required Information:** Provide product identification; manufacturer's name and address; manufacturer's literature including product description, performance and test data and all reference standards; samples; and name and address of similar projects using the product, including dates of installation and names of Architect and City Representative.
 - 2. **Data Comparison:** Submit a side-by-side, item-by-item comparison of all characteristics of the specified product and the proposed product.
 - 3. **Construction Schedule:** Provide statement of effect of substitution on construction schedule.
 - 4. **Cost Comparison:** Submit cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
 - 3. **City's Action:** If necessary, the City's Representative will request additional information or documentation for evaluation within one (1) week of receipt of a request for substitution. The City's Representative will notify the Contractor of acceptance or rejection of the substitution within two (2) weeks of receipt of the request, or one (1) week of receipt of additional information or documentation, whichever is later. Acceptance of equals submitted during the bid period will be in the form of an addendum. Acceptance of substitutions requested after award of the Contract will be in the form of a Change Order.
 - 4. **Distribution:** Accepted substitution requests will be distributed as electronic copy (PDF) to the Architect, City Representative, and Contractor.
- D. **COORDINATION:** The City's Representative's acceptance of product as "equal" or as a substitution does not relieve Contractor from responsibility for compliance with requirements of any portion of Contract Documents; Contractor shall be responsible, at Contractor's own expense, for any changes in other parts of the Work which may be caused by such substitution.

2. PRODUCTS:

NOT USED

3. EXECUTION:

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CONTRACT MODIFICATION PROCEDURES Section 01 26 00

1. GENERAL:

- A. DESCRIPTION: Requirements for documentation of changes in the Work, as defined in the Construction Contract
- B. CHANGE PROCEDURES:
 - 1. Authorized Agent: Submit to City's Representative the name of the individual authorized to receive change documents and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
 - 2. Proposal Request: City's Representative may issue a Proposal Request which includes a detailed description of a proposed change in the Work. Contractor will prepare and submit an estimate within ten (10) days.
 - 3. Request for Change: Contractor may propose a change by submitting a written request to the City's Representative, describing the proposed change and its full effect on the Work; include a statement describing the reason for the change, the effect on the Contract Sum/Price and Contract Time with full documentation, and a statement describing the effect on work by separate or other contractors. Document any requested substitutions in accordance with Section 01 25 00 - SUBSTITUTION PROCEDURES.
 - 4. Distribution of Completed Documents: Completed Change Orders, Construction Change Directives, and Supplemental Instructions will be in PDF form.
- C. CHANGE ORDERS:
 - 1. Format: Issued by City's Representative to order changes to the work which involve a change in Contract Price and/or Contract Time.
 - 2. Documentation of Change in Contract Price And/or Contract Time:
 - a. General: Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.
 - b. Quotation Breakdown: Itemize each quotation for a change in cost or time in sufficient detail to allow evaluation of the quotation. As a minimum, itemize separately each significant material and equipment purchase and the work of each trade and subcontractor.
 - c. Supporting Data:
 - 1. Costs: Separate costs for products, labor, equipment, and subcontractor quotations.
 - 2. Quantities: Products, labor, and equipment.
 - 3. Taxes, Insurance and Bonds: As required.
 - 4. Overhead and Profit: As required.
 - 5. Justification: Change in Contract Time.
 - 6. Credit: For deletions from Contract, similarly documented.
 - 7. Additional Data: On request, as required to support computations.
 - d. Claim for Additional Costs:
 - 1. General: Support each claim for additional costs, and for work done on a time and material basis, with the following additional information:
 - 2. Origin and Date of Claim: State name and originator and date.
 - 3. Dates and Times: When work was performed and by whom.
 - 4. Time Records and Wage Rates: As recorded and paid.
 - 5. Invoices and Receipts: For products, equipment, and subcontracts, similarly documented.
 - 3. Execution of Change Orders: City's Representative will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- D. CONSTRUCTION CHANGE DIRECTIVE: Issued by City's Representative instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. The document will describe changes in the Work, and will designate method of determining any change in Contract Price or Contract Time. Promptly execute the change in Work.
- E. SUPPLEMENTAL INSTRUCTIONS: Issued by City's Representative to provide supplemental instructions, interpretations, or order minor changes in the Work not involving an adjustment to Contract Price or Contract Time.

2. PRODUCTS:

- A. TYPES OF CHANGE ORDERS:
 - 1. Stipulated Price Change Order: Based on Proposal Request and Contractor's maximum price quotation or Contractor's request for a Change Order approved by City's Representative.
 - 2. Unit Price Change Order:
 - a. General: For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Directive.

- b. Pre-determined Unit Prices and Quantities: Change Order will be executed on a fixed unit price basis.
- c. Changes in Contract Price or Contract Time: Computed as specified for Time and Material Change Order.
- 3. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. City's Representative will determine the change allowable in Contract Price and/or Contract Time as provided in the Contract Documents. Maintain detailed records of work done on time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

3. EXECUTION:

A. CORRELATION OF CONTRACTOR SUBMITTALS:

- 1. General: Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
- 2. Progress Schedule: Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust time for other items of work affected by the change, and resubmit.
- 3. Record Documents: Record authorized changes in Project Record Documents.

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INFORMATION REQUEST PROCEDURE

Section 01 26 31

1. GENERAL:

- A. DESCRIPTION: Submit request for information, interpretation and/or clarification to the City's Representative promptly upon identification of need, and in reasonable time so as not to affect the progress of the Work.
- B. SUBMISSION PROCEDURES:
 - 1. General: Request for information beyond that set forth in the Contract Documents will be considered only when the request is in writing and fully documented.
 - 2. Time: Identify and submit requests for information in a timely manner.
 - 3. Pre-submission Review: Before submitting request to the City's Representative, Contractor shall conduct a review to determine that the information requested, including items submitted by subcontractors or suppliers, is not shown in the Contract Documents.
 - 4. Category of Request:
 - a. General: Submit requests for information when one or more of the following conditions occur:
 - b. Need for Clarification: When information shown or indicated in the Contract Documents is unclear in its intent.
 - c. Unforeseen Condition: Discovery of unforeseen condition or circumstance that is not shown or indicated in the Contract Documents.
 - d. Conflict Within Documents: Discovery of an apparent inconsistency, conflict or discrepancy between different portions of the Contract Documents, where the intent cannot be reasonably inferred from information shown or indicated.
 - e. Omission: Discovery of what appears to be an omission in the Contract Documents, where the intent cannot be reasonably inferred from information shown or indicated.
 - f. Coordination Problem: Discovery of unforeseen condition in coordinating placement of work that is specifically related to the Contract Documents.
 - 5. Unacceptable Requests:
 - a. General: Do not submit requests for information for confirmation of any action already taken by the Contractor. Requests will not be accepted that imply confirmation of any unauthorized change to the Work.
 - b. Untimely Submission: A request for information that is submitted in a belated manner without proper coordination and scheduling of the Work of related subcontractors will not be reviewed and will be returned to the Contractor.
 - c. Submittal: A request for information that is included as part of a submittal will not be processed; see Section 01 33 10 - SUBMITTALS.
 - d. Substitution: A request for information that is a request for substitution will not be processed; see Section 01 25 00 - SUBSTITUTION PROCEDURES.
 - e. Exclusionary Submission: A request that implies that specific portions of the work are assumed to be excluded or considering a separate portion of the Contract Documents in part rather than as a whole will not be processed.
 - 6. Log: Contractor shall prepare and maintain the official log of requests for information. Review status of log at each job progress meeting.

2. PRODUCTS:

- A. SUBMISSION REQUIREMENTS:
 - 1. Request for Information (RFI) Form:
 - a. General: Provide a completed and legible electronic copy (PDF) of the RFI Form with each submittal.
 - b. RFI Number: Identify RFIs sequentially starting from number one (1); number re-submissions with same number as original and add letter designation A., B., C., etc., in order submitted, until resolution is achieved.
 - c. Contractor: Provide company name and mailing address with signature of contact person responsible for work on this Project, certifying to review of RFI.
 - d. Subcontractor and/or Supplier: Provide company name, mailing address, telephone number and name of contact person responsible for work on this Project.
 - e. RFI Description:
 - 1. General: Describe subject of RFI completely.
 - 2. Specifications References: Identify specification section number and paragraph number under consideration.
 - 3. Drawing References: Identify specific drawing number and/or detail number under consideration.
 - 4. Attachments: Identify as required, to support description.

- f. Contractor's Proposed Resolution:
 - 1. General: Describe suggested resolution; support with attachments as required.
 - 2. Cost Impact: Indicate impact on costs; explain Contractor's original basis for bid and, based on the current request, reason that additional costs should be considered.
 - 3. Time Impact: Indicate effect on schedule; explain Contractor's original basis for bid and, based on the current request, why a time extension should be considered.

3. EXECUTION:

A. CITY REPRESENTATIVE'S RESPONSE:

- 1. General: City's Representative will respond on the RFI Form in accordance with the General Provisions and include attachments, as referenced. Verbal responses to such requests are to be considered informational; official written response will only be given on annotated PDF of original RFI Form.
- 2. City's Representative's Review:
 - a. General: Allow fourteen (14) calendar days after receipt. If more than ten (10) requests are received within one (1) calendar week, the City's Representative will specifically schedule and extend response time as required to accomplish the reviews.
 - b. Prioritization: If more than five (5) requests have been received by the City's Representative, the Contractor shall identify the order of requests most critical to the schedule of the Project.

B. DISTRIBUTION:

- 1. General: Submit PDF of original, signed copy. PDF of annotated official response will be returned to the Contractor by the City's Representative.
- 2. Consultants: The City's Representative will distribute PDFs of requests for information to project consultants, as required for their participation. Direct communication and response between project consultants and Contractor will be considered informational only.
- 3. Response: The Contractor will make and distribute copies of the official response to subcontractors and suppliers, as required.

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PROJECT MANAGEMENT & COORDINATION Section 01 31 00

1. GENERAL:

- A. **SUMMARY:** Coordinate scheduling, submittals, and Work of the various sections of these Specifications to assure the efficient and orderly sequence of installation of each part of the Work. Coordinate construction operations included under different sections that depend on each other for proper installation, connection, and operation.
- B. **SUBMITTALS:**
 - 1. **General:** Within seven (7) calendar days of receipt of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the superintendent and other key personnel in attendance at the Project Site. Identify each individual by name, title, and provide a description of their duties and responsibilities. Update list within seven (7) calendar days of any staff change.
 - 2. **Communications:** Submit written procedures for Project communications including submittals, reports and records, schedules, coordination drawings, and recommendations.
 - 3. **Coordination Drawings:** Submit as required under Section 01 33 10 - SUBMITTALS. Prepare where careful coordination is required for installation of products and materials fabricated by separate entities and/or where limited space availability requires maximum utilization of space for efficient installation of different components. Show the relationship of components and required installation sequences.
- C. **SCHEDULING:**
 - 1. **General:** Refer to Section 01 32 14 - PROGRESS SCHEDULE.
 - 2. **Administrative Procedures:** Coordinate scheduling and timing of required administrative procedures such as preparation of schedules, installation and removal of temporary facilities, delivery and processing of submittals, progress meetings, and Project closeout activities, with other construction activities to avoid conflicts and assure orderly progress of the Work.
- D. **MEETINGS:**
 - 1. **General:** Schedule and administer meetings throughout progress of the Work at biweekly intervals.
 - 2. **Duties:** Schedule meetings, prepare agenda with copies for participants, preside at meetings, and distribute copies of minutes within two (2) days of receipt from the City's Representative to the participants and those affected by decisions made.
 - 3. **Attendance Required:** Job superintendent, major subcontractors and suppliers, and the Architect, as appropriate to agenda topics for each meeting.
 - 4. **Agenda:** Include review of minutes of previous meeting; review of Work progress; field observations; problems and decisions; review of submittals schedule and status of submittals; review of off-site fabrication and delivery schedules; maintenance of progress schedule; corrective measures to regain projected schedules; planned progress for succeeding work period; projected progress of coordination; maintenance of quality of work standards; effect of proposed changes on progress schedule and coordination; other business relating to Work.
- E. **CONSTRUCTION MOBILIZATION:** Coordinate the use of the site and facilities. Allocate mobilization areas of site; allow for field offices and sheds, access, traffic, and parking facilities.

2. PRODUCTS:

- A. **MATERIALS:** Refer to Section 01 60 00 - PRODUCT REQUIREMENTS.

3. EXECUTION:

- A. **PERFORMANCE:** Refer to Section 01 73 10 - EXECUTION REQUIREMENTS.

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PROGRESS SCHEDULE

Section 01 32 14

1. GENERAL:

- A. DESCRIPTION: Within fifteen (15) days after award of the Contract, submit to the City's Representative estimated construction progress schedules for the Work, with subschedules of related activities essential to its progress.
- B. SUBMITTALS:
 - 1. General: Submit progress schedules in PDF form.
 - 2. Schedules: Submit preliminary schedule for review; after review, resubmit required construction schedule with revised data within ten (10) days.
 - 3. Revised Schedules: Submit with each Application for Payment.
 - 4. Distribution: Distribute copies of reviewed Schedules to project site, subcontractors, suppliers, and other concerned parties. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in Schedules.
- C. CONTENT:
 - 1. Format:
 - a. CPM Schedule: Prepare network analysis system using the critical path method, as outlined in The Associated General Contractors of America (AGC) publication "The Use of CPM in Construction - A Manual for General Contractors".
 - b. Sequence of Listings: The chronological order of the start of each item of Work.
 - 2. Phases: Identify work of separate stages and other logically grouped activities. Provide sub-schedules for each stage of Work identified in Section 01 11 00 - SUMMARY OF WORK. Provide sub-schedules to define critical portions of the entire Schedule. Include material lead time durations in construction schedule and procurement log.
 - 3. Items of Work: Identify each item by specification section number.
 - 4. Percentage of Completion: Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
 - 5. Scheduled Submittals: Provide separate schedule of submittal dates for shop drawings, product data, and samples, including City furnished products, and dates reviewed submittals will be required from City's Representative. Indicate decision date for selection of finishes.
 - 6. City Furnished Products: Indicate delivery dates.
 - 7. Schedule of Values: Coordinate content with submitted Schedule of Values.
- D. REVISIONS TO SCHEDULES:
 - 1. General: Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Revisions: Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
 - 3. Reports: Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

2. PRODUCTS:

Not Used.

3. EXECUTION:

Not Used.

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PHOTOGRAPHIC DOCUMENTATION

Section 01 32 33

1. GENERAL:

A. SUMMARY:

1. General: Provide Photographic Documentation, as specified per Contract Documents.
2. Work Included:
 - a. Preconstruction photographs.
 - b. Periodic construction photographs.
 - c. Final Completion construction photographs.

B. SUBMITTALS:

1. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph.
2. Construction Photographs:
 - a. General: Submit 2 prints of each photographic view within 7 days of taking photographs.
 - b. Format: 8-by-10-inch smooth-surface matte prints on single-weight commercial-grade photographic paper.
 - c. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 1. Name of Project.
 2. Name and address of photographer.
 3. Name of Architect and Construction Manager.
 4. Name of Contractor.
 5. Date photograph was taken if not date stamped by camera.
 6. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 7. Unique sequential identifier.
3. Digital Images:
 - a. General: Submit a complete set of digital image electronic files with each submittal of prints on acceptable electronic transfer medium. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.
 - b. Usage Rights: Submit statement of transfer copyright usage rights to the City allowing unlimited reproduction of photographic documentation.
4. Video Recording:
 - a. General: Provide video recording in in addition to photographs specified in paragraph, "Preconstruction Photographs." Submit one copy in digital video on acceptable media.
 - b. Identification: Provide an applied label on each copy with the name of project, name of contractor and date recorded.

C. QUALITY ASSURANCE:

1. Qualifications: Professional engaged as a photographer of construction projects with minimum three (3) years documented experience.

2. PRODUCTS:

A. PHOTOGRAPHIC MEDIA:

1. Digital Images: Provide images capable of a digital capture resolution of not less than 3200 x 2400 megapixels.

3. EXECUTION:

A. CONSTRUCTION PHOTOGRAPHS:

1. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
2. Key Plan: Maintain with each set of construction photographs that identifies each photographic location.
3. Digital Images:
 - a. General: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - b. Date and Time: Include date and time in filename for each image.
 - c. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project Site, available at all times for reference. Identify images same as for those submitted to Architect and Construction Manager.
4. Preconstruction Photographs:
 - a. General: Before starting construction, take color photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

- b. Construction Limits: Flag before taking construction photographs.
 - c. Adjacent Conditions:
 - 1. General: Take three (3) color photographs, from different views, to show existing conditions adjacent to property before starting the Work.
 - 2. Existing Buildings: Take three (3) color photographs, different views, of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 5. Construction Condition Photographs: Provide as directed by the Architect, as separately authorized work order.
 - 6. Time-Lapse Sequence Construction Photographs:
 - a. General: Take three (3) color photographs, different views, to show status of construction and progress since last photographs were taken.
 - b. Frequency: Provide coinciding with each Application for Payment.
 - 7. Final Completion Construction Photographs: Take three (3) color photographs, different views, after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
- B. VIDEO RECORDINGS:
- 1. General: Describe scenes on video recording by audio narration by microphone while video recording is recorded, with a verbal description of items being viewed.
 - 2. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
 - 3. Date and Time: Confirm at beginning and end of recording.
 - 4. Project Identification: Begin each video recording with name of Project, Contractor's name, and Project location.

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SUBMITTALS

Section 01 33 10

1. GENERAL:

- A. DESCRIPTION: Submit certifications, shop drawings, product data/material lists, manufacturer's instructions, and samples to the City's Representative for review as required.
- B. RELATED REQUIREMENTS SPECIFIED ELSEWHERE:
 - 1. General: Specific submittal requirements are identified in the individual Sections of these specifications.
 - 2. Product Substitution Procedures: Section 01 25 00 - SUBSTITUTION PROCEDURES; products lists and substitution requests.
 - 3. Requests for Information (RFI): Section 01 26 31 - INFORMATION REQUEST PROCEDURE.
 - 4. Progress Schedule: Section 01 32 14 - PROGRESS SCHEDULE.
 - 5. Testing Laboratory Services: Section 01 45 23 - TESTING AND INSPECTION SERVICES; test reports.
 - 6. Closeout Procedures: Section 01 77 00 - CLOSEOUT PROCEDURES; operating and maintenance manuals, record drawings, and guarantees.
- C. SUBMISSION PROCEDURES:
 - 1. General: Schedule submissions a minimum three (3) weeks before required for use.
 - 2. Submittal Requirements:
 - a. General: Conform to specified procedures in submission of required submittals.
 - b. Specified Products and Alternate Manufacturers: Products of specified manufacturers and named acceptable alternate manufacturers require submission of listed submittals.
 - c. "Accepted Equals" and Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES; requests for acceptance of products as "equal" or as substitution shall include listed submittals for subject products, requirements of the Substitution Request, and be submitted within the time frames specified in Section 01 25 00 - SUBSTITUTION PROCEDURES.
 - 3. Submissions:
 - a. General: After issuance of Notice to Proceed make submissions no later than the following number of days, unless specified otherwise in individual specification Section.
 - b. Early Start and/or Long Lead-Time Items: 30 calendar days.
 - c. Color Selection Items: 30 calendar days.
 - d. Electrical, Mechanical and Equipment Items: 60 calendar days.
 - e. All Other Items: 90 calendar days.
- D. SUBMISSION REQUIREMENTS:
 - 1. Cover Sheet:
 - a. General: Provide a completed copy of the Submittal Cover Sheet with each submittal.
 - b. Submittal Number: Identify first submittal as number one (1); number re-submittals, if required, with succeeding numbers.
 - c. Specification Section: Identify submitted work with section number shown in the Project Manual. Provide separate submittals for each specification section, as required.
 - d. Contractor: Provide company name and mailing address with signature of contact person responsible for work on this project, certifying to review of submittal, verification of field requirements and compliance with Contract Documents.
 - e. Subcontractor: Provide company name, mailing address, telephone number and name of contact person responsible for work on this project.
 - f. Submittal Description:
 - 1. General: Describe contents of submittal completely; identify if material is a resubmittal, and give previous submittal number.
 - 2. Submittal Index: List items included in submittal; properly cross reference to Contract Documents.
 - 2. Identification of Submittals:
 - a. Date: Submission date and revision dates.
 - b. Project: Project name and number; names of Architect, Contractor, and Subcontractor.
 - c. Product or Material: Name of manufacturer, product name or model number, and supplier.
 - d. Contractor's Stamp: Initialed or signed, certifying to review of submittal, verification of field requirements and compliance with contract documents.

3. Number of Copies Required:
 - a. Certifications, Shop Drawings, Product Data/Material Lists and Manufacturer's Instructions: One (1) electronic copy (PDF) of each submittal.
 - b. Samples:
 1. General: As identified in individual specification section.
 2. Color/Pattern Selection: One set of manufacturer's complete range for initial selection; additional samples as requested of selected color/pattern for final color schedule.
- E. SUBMITTALS:
 1. Shop Drawings:
 - a. General: Submit manufacture and installation details, including fastenings, for review. Make drawings legible and complete in every respect. Show relationship to adjacent structure or material; clearly identify all field dimensions.
 - b. Variations: If shop drawings show variations from Contract requirements because of standard shop practice or other reason, specifically note such variations in letter of transmittal, as well as on drawings.
 - c. Distribution: Reviewed shop drawings will be returned to Contractor for subsequent action, as required.
 1. No Resubmittal Required: Electronic copy (PDF) sent; Contractor may make copies for distribution.
 2. Resubmittal Required: Electronic copy (PDF) sent. Make corrections to original drawings and send new electronic copy (PDF) to the City's Representative for review. Secure final review prior to commencing work.
 2. Product Data/Material Lists:
 - a. Manufacturer's Standard Schematic Drawings:
 1. General: Provide standard drawings; delete information not applicable to Project.
 2. Additional Information: Supplement standard information as required for Project.
 - b. Product Data:
 1. General: Provide manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
 2. Identification: Clearly mark each copy; identify required materials, products or models.
 3. Required Information: Provide dimensions and clearances required; performance characteristics and capacities; and diagrams of equipment and controls.
 - c. Distribution: Reviewed product data will be returned to Contractor for subsequent action, as required.
 1. No Resubmittal Required: Electronic copy (PDF) sent; Contractor may make copies for distribution.
 2. Resubmittal Required: Electronic copy (PDF) sent. Make corrections to original drawings and send new electronic copy (PDF) to the City's Representative for review. Secure final review prior to commencing work.
 3. Manufacturer's Instructions:
 - a. General: Submit most recent applicable printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing of the subject material, as provided by the manufacturer for use under conditions similar to those of this Project.
 - b. Distribution: Reviewed manufacturer's instructions will be returned to Contractor for subsequent action, as required.
 1. No Resubmittal Required: Electronic copy (PDF) sent; Contractor may make copies for distribution.
 2. Resubmittal Required: Electronic copy (PDF) sent. Make corrections to original drawings and send new electronic copy (PDF) to the City's Representative for review. Secure final review prior to commencing work.
 4. Samples:
 - a. General: Submit samples to illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices.
 - b. Finishes: Submit manufacturer's full range of standard colors, patterns and textures.
 - c. Office Samples: Provide in sufficient size and quantity to clearly illustrate product.
 - d. Field Samples and Mock-Ups: Erect at Project site at location acceptable to the City's Representative. Construct each sample or mockup complete, including work of trades required in finished work. After review, samples may be used in construction of project, as specified.

F. SUBMITTAL REVIEW:

1. **General:** Make submittals as required to cause no delay in the orderly progress of work, layout or fabrication under Contract, due allowance being made for checking by the City's Representative and for such corrections, resubmission and rechecking as may be necessary. Do not commence work requiring submittals until review by City's Representative has been completed.
2. **Review:** The City's Representative's review will be for general conformance with the Contract Documents. Review does not relieve Contractor from responsibility for coordinating work of various trades and compliance with requirements of Contract Documents for lengths, fit and other details, or from furnishing materials and work required by contract which may not be indicated on submittals when reviewed. Review does not authorize changes from Contract requirements. Efforts will be made by the City's Representative to identify errors and omissions, but General Contractor is responsible for the accuracy and correctness of submittals.
3. **Color Selections:** The City's Representative will make no color selections until all submittals related to color have been received and materials reviewed.

G. CERTIFICATIONS:

1. **General:** Where specifically indicated by individual Sections, submit certification of recognized producer or association.
2. **Qualifications:** Under various sections of these specifications, under paragraph 1.3 QUALITY ASSURANCE, certain experience requirements and other qualifications may be required. When such requirements are specified, submit written certification of such requirements to the City's Representative within thirty-five (35) days of date of Notice to Proceed.
3. **Products:**
 - a. **Asbestos:** Submit written certification that no materials containing asbestos have been included in the Work as required in Section 01 43 00 - QUALITY ASSURANCE.
 - b. **Volatile Organic Compounds (VOC):** Provide written certification that materials used in construction operations and installed in the work comply with the requirements of the environmental protection agency having jurisdiction at the location of this Project.

2. PRODUCTS

Not Used

3. EXECUTION:

Not Used

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SUSTAINABLE DESIGN REPORTING

Section 01 33 29

1. GENERAL:

A. SUMMARY:

1. General: This Section includes general requirements and procedures for compliance with certain U.S. Green Building Council's (USGBC) LEED prerequisites and credits needed for the Project to obtain LEED Silver certification.
2. Other LEED prerequisites and credits needed to obtain LEED certification are dependent on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests.
3. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification are dependent on the Architect's design and other aspects of the Project that are not part of the Work of the Contract.
4. Related Sections: Divisions 01 through 33 Sections for LEED requirements specific to the Work of each of those Sections. These requirements may or may not include reference to LEED.

B. DEFINITIONS:

1. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria." Certificates shall include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.
2. LEED: Leadership in Energy & Environmental Design.
3. Rapidly Renewable Materials: Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.
4. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.
5. Regionally Extracted, Harvested, or Recovered Materials: Materials that are extracted, harvested, or recovered and manufactured within a radius of 500 miles from the Project site.
6. Recycled Content:
 - a. General: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).
 - b. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
 - c. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

C. SUBMITTALS:

1. General: Submit additional LEED submittal requirements included in other sections of the Specifications. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
2. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project. Include statement indicating total cost of mechanical and electrical components.
3. LEED Action Plans:
 - a. General: Provide preliminary submittals within 30 days of date of Notice to Proceed indicating how the following requirements will be met.
 - b. Credit MR 2.1 and 2.2: Waste management plan complying with Division 01 Section "Construction Waste Management."
 - c. Credit MR 4.1 and 4.2:
 1. General: List of proposed materials with recycled content.
 2. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 - d. Credit MR 5.1 and 5.2:
 1. General: List of proposed regionally manufactured materials and regionally extracted, harvested, or recovered materials.
 2. Identify each regionally manufactured material, its source, and cost.
 3. Identify each regionally extracted, harvested or recovered material, its source, and cost.
 - e. Credit MR 7.0:
 1. General: List of proposed certified wood products.

2. Indicate each product containing certified wood, its source, and cost.
3. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.
- f. Credit EQ 3.1: Construction indoor air quality management plan.
4. LEED Progress Reports:
 - a. General: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
 - b. Credit MR 2.1 and 2.2: Waste reduction progress reports complying with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - c. Credit MR 4.1 and 4.2: Recycled content.
 - d. Credit MR 5.1 and 5.2: Regionally manufactured materials and regionally extracted, harvested, or recovered materials.
 - e. Status on commissioning process, construction IAQ management plan, and low-emitting materials.
5. LEED Documentation Submittals:
 - a. Credit SS 7.2: Product Data for roofing materials indicating Energy Star compliance for green vegetated roof system.
 - b. Credit WE 3.1 and 3.2: Product Data for plumbing fixtures indicating water consumption.
 - c. Prerequisite EA 3.0: Product Data for new HVAC equipment indicating absence of CFC refrigerants.
 - d. Credit EA 4.0: Product Data for new HVAC equipment indicating absence of HCFC refrigerants, and for clean-agent fire-extinguishing systems indicating absence of HCFC and Halon.
 - e. Credit MR 2.1 and 2.2: Comply with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - f. Credit MR 4.1 and 4.2: Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
 - g. Credit MR 5.1 and 5.2:
 1. General: Product Data indicating location of material manufacturer for regionally manufactured materials.
 2. Include statement indicating cost and distance from manufacturer to Project for each regionally manufactured material.
 3. Include statement indicating cost and distance from point of extraction, harvest, or recovery to Project for each raw material used in regionally manufactured materials.
 - h. Credit MR 7.0:
 1. General: Product Data and certificates of chain-of-custody for products containing certified wood.
 2. Include statement indicating costs for each product containing certified wood.
 3. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.
 - i. Credit EQ 1.0: Product Data and Shop Drawings for carbon dioxide monitoring system.
 - j. Credit EQ 3.1:
 1. Construction indoor air quality management plan.
 2. Product Data for temporary filtration media.
 3. Product Data for filtration media used during occupancy.
 4. Construction Documentation: Six photographs at three different occasions during construction along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 - k. Credit EQ 3.2:
 1. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
 2. Product Data for filtration media used during flush-out and during occupancy.
 3. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing conformance with IAQ testing procedures and requirements.
 - l. Credit EQ 4.1: Product Data and material safety data sheets (MSDSs) for adhesives and sealants used on the interior of the building indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA method 24).
 - m. Credit EQ 4.2: Product Data and material safety data sheets (MSDSs) for paints and coatings used on the interior of the building indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA method 24).
 - n. Credit EQ 4.3: Product Data for carpet products indicating VOC content of each product used.

- used.
- o. Credit EQ 4.4: Product Data for composite wood and agrifiber products indicating that products contain no urea-formaldehyde resin.
- p. Include statement indicating adhesives and binders used for each product.
- q. Credit EQ 6.2: Product Data and Shop Drawings for sensors and control system used to provide individual airflow and temperature controls for minimum 50 percent of non-perimeter, regularly occupied space.
- r. Credit EQ 7: Product Data and Shop Drawings for sensors and control system used to monitor and control room temperature and humidity.

2. PRODUCTS:

A. RECYCLED CONTENT OF MATERIALS:

1. Credit MR 4.1: Provide building materials with recycled content such that post-consumer recycled content constitutes a minimum of five percent of the cost of materials used for the Project or such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 30 percent of the cost of materials used for the Project.
2. Credits MR 4.1 and MR 4.2: Provide building materials with recycled content such that post-consumer recycled content constitutes a minimum of 10 percent of the cost of materials used for the Project or such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20 percent of the cost of materials used for the Project.
3. The cost of post-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
4. The cost of post consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
 - a. Do not include mechanical and electrical components in the calculation.
 - b. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).

B. REGIONAL MATERIALS:

1. Credit MR 5.1: Provide 20 percent of building materials (by cost) that are regionally manufactured materials.
2. Credit MR 5.2: Of the regionally manufactured materials required by Paragraph "Credit MR 5.1" above, provide at least 50 percent (by cost) that are regionally extracted, harvested, or recovered materials.

C. CERTIFIED WOOD:

1. Credit MR 7.0:
 - a. General: Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
 - b. Wood-based materials include but are not limited to the following materials when made from made wood, engineered wood products, or wood-based panel products:
 - c. Rough carpentry.
 - d. Miscellaneous carpentry.
 - e. Finish carpentry.
 - f. Architectural woodwork.
 - g. Wood cabinets.
 - h. Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection.

D. LOW-EMITTING MATERIALS:

1. Credit EQ 4.1:
 - a. General: For interior applications use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):
 - b. Wood Glues: 30 g/L.
 - c. Metal to Metal Adhesives: 30 g/L.
 - d. Adhesives for Porous Materials (Except Wood): 50 g/L.
 - e. Subfloor Adhesives: 50 g/L.
 - f. Cove Base Adhesives: 50 g/L.
 - g. Gypsum Board and Panel Adhesives: 50 g/L.
 - h. Rubber Floor Adhesives: 60 g/L.
 - i. Ceramic Tile Adhesives: 65 g/L.
 - j. Multipurpose Construction Adhesives: 70 g/L.
 - k. Fiberglass Adhesives: 80 g/L.

- l. Structural Glazing Adhesives: 100 g/L.
 - m. Contact Adhesive: 250 g/L.
 - n. Plastic Cement Welding Compounds: 350 g/L.
 - o. ABS Welding Compounds: 400 g/L.
 - p. CPVC Welding Compounds: 490 g/L.
 - q. PVC Welding Compounds: 510 g/L.
 - r. Adhesive Primer for Plastic: 650 g/L.
 - s. Sealants: 250 g/L.
 - t. Sealant Primers for Nonporous Substrates: 250 g/L.
 - u. Sealant Primers for Porous Substrates: 775 g/L.
2. Credit EQ 4.2:
- a. General: For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:
 - b. Flat Paints and Coatings: VOC not more than 50 g/L.
 - c. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
 - d. Anti-Corrosive Coatings: VOC not more than 250 g/L.
 - e. Varnishes and Sanding Sealers: VOC not more than 350 g/L.
 - f. Stains: VOC not more than 250 g/L.
 - g. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - h. Restricted Components:
 - 1. General: Paints and coatings shall not contain any of the following:
 - 2. Acrolein.
 - 3. Acrylonitrile.
 - 4. Antimony.
 - 5. Benzene.
 - 6. Butyl benzyl phthalate.
 - 7. Cadmium.
 - 8. Di (2-ethylhexyl) phthalate.
 - 9. Di-n-butyl phthalate.
 - 10. Di-n-octyl phthalate.
 - 11. 1,2-dichlorobenzene.
 - 12. Diethyl phthalate.
 - 13. Dimethyl phthalate.
 - 14. Ethylbenzene.
 - 15. Formaldehyde.
 - 16. Hexavalent chromium.
 - 17. Isophorone.
 - 18. Lead.
 - 19. Mercury.
 - 20. Methyl ethyl ketone.
 - 21. Methyl isobutyl ketone.
 - 22. Methylene chloride.
 - 23. Naphthalene.
 - 24. Toluene (methylbenzene).
 - 25. 1,1,1-trichloroethane.
 - 26. Vinyl chloride.
3. Credit EQ 4.4: Do not use composite wood and agrifiber products that contain urea-formaldehyde resin.

3. EXECUTION:

A. SITE DISTURBANCE:

- 1. Credit SS 5.1: Comply with requirements of Section 01 11 00 - SUMMARY OF WORK.

B. REFRIGERANT AND CLEAN-AGENT FIRE-EXTINGUISHING-AGENT REMOVAL:

- 1. Prerequisite EA 3.0: Remove CFC-based refrigerants from existing HVAC and refrigeration equipment indicated to remain and replace with refrigerants that are not CFC based. Replace or adjust existing equipment to accommodate new refrigerant as described in Division 23 - HEATING, VENTILATING AND AIR CONDITIONING Sections.
- 2. Credit EA 4.0:
 - a. General: Remove HCFC-based refrigerants from existing HVAC and refrigeration equipment indicated to remain and replace with refrigerants that are not HCFC based. Replace or adjust equipment to accommodate new refrigerant.
 - b. Additional Requirements: Refer to Division 23 - HEATING, VENTILATING AND AIR CONDITIONING for additional requirements.

- C. CONSTRUCTION WASTE MANAGEMENT:
 - 1. Credit MR 2.1 and 2.2: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
- D. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT:
 - 1. Credit EQ 3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.
 - 2. Credit EQ 3.2: Conduct a two-week building air flush-out after construction ends with new filtration media and 100 percent outside air. Replace filtration media after building air flush-out.

* * *

ELECTRONIC MEDIA TRANSFER AGREEMENT Section 01 33 90

1. GENERAL:

- A. DESCRIPTION: This section provides procedures for the Contractor's use of the Architect's computer aided design (CAD) files for preparation of submittals.
- B. SUBMISSION PROCEDURES:
 - 1. General: Submit request for electronic data transfer by signing the Agreement included at the end of this Section and sending PDF with an appropriate explanatory transmittal to the Architect.
 - 2. Time: Submit request a minimum of seven (7) days prior to the date that files are needed.
- C. ARCHITECT'S RESPONSE: Architect will email the files or provide files on electronic media, as requested in the transmittal. Files will be in the program used by the Architect's firm; any necessary translations will be the responsibility of the Contractor. Architect is not responsible for any problems encountered as a result of electronic transmission or translation.
- D. DISTRIBUTION: PDF of the completed Agreement will be returned to the Contractor.

2. PRODUCTS:

Not Used

3. EXECUTION:

Not Used

* * *

ELECTRONIC MEDIA TRANSFER AGREEMENT

PROJECT NAME: Fire Station No. 2 (Bayside)
San Diego, California

ARCHITECT: Rob Wellington Quigley, FAIA
434 West Cedar Street
San Diego, CA 92101

CONTRACTOR: Firm Name:
Address:
City, State, Zip:

Electronic media will remain the property of the Architect and its consultants and will be subject to their copyright. The Architect and its consultants will provide the Contractor only a working copy of the electronic media. Said working copy will have indices of the Architect's and consultants' ownership, professional name, and/or involvement in the project removed from the electronic display.

This computer aided design (CAD) working copy is provided for the convenience of the recipient only. The working copy represents data prepared as the Architect's and its consultants' internal set of working documents. As such it may be incomplete, contain deliberate or unintentional inaccuracies or be in part obsolete. In addition, intentional or unintentional changes to the working copy may occur during its use, storage, or translation by parties other than the Architect and its consultants, and the Architect and its consultants have no control over such changes that may occur. Therefore, the Architect and its consultants make no representation as to the completeness, currency or accuracy of the working copy. The Contractor is further warned that, while digital CAD data appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. The Contractor takes full responsibility for the accuracy and correctness of measurements, areas, inventories, etc. extracted from this data either manually or with the use of a computer, and for conclusions drawn from this data.

The Contractor is advised that translation of CAD data from one computer system or environment to another can and often does result in the loss of data. This loss can include but may not be limited to: portions of text and dimensions - the existence, location or scale of symbols or other elements of graphics - the internal structure of the data including layers and data attributes - the style or weight of lines. The Architect and its consultants make no representation as to the usability of this CAD data on any system.

The Contractor is advised to review all current and subsequent project documentation issued for inconsistencies and revisions. It is the responsibility of the Contractor to identify and make required revisions and corrections to the data on the working copy.

The Contractor acknowledges that the Architect and its consultants provide the working copy for information only and they do not represent that the electronic media will exactly correspond to the Contract Documents. A statement will be electronically placed on each working copy drawing sheet as follows: "Not for construction purposes. The Contract Documents as bid may contain additions, modifications, or deletions not shown on this working copy." Based in part, but not limited to, the foregoing discussion of the limitations and character of the working copy to be provided under this agreement, the Contractor specifically acknowledges that the working copy may be unreliable and/or inaccurate and/or incomplete. Contractor further acknowledges that it has and shall continue to have the sole responsibility for the accurate, complete, and timely production, completion, and submission of shop drawings and other documents prepared with the assistance of the working copy, and that the receipt of the working copy does not diminish or affect Contractor's duty with regard to said production, completion, or submission. As such, Contractor agrees that use of the working copy shall be undertaken solely at its own risk, and that the Architect and its consultants shall assume no liability whatsoever that may arise out of such use by the Contractor or any other party.

In furtherance of the above, and in consideration of the use of the working copy, Contractor agrees to release and, to the fullest extent permitted by law, defend, indemnify, and hold harmless the City, Architect and its partners, consultants, agent and employees from and against any and all claims, suits, actions, demands, losses, expenses, damages, penalties, and liabilities of any kind, including without limitation, attorney fees, arising out of or relating to such other use or changes to such working copy.

In addition, Contractor and Architect agree that this agreement is not a construction contract within the scope of California Civil Code section 2782.

Contractor shall ensure that any subcontractor to whom he permits access to the working copy shall be bound in writing to all the terms of this agreement.

Contractor and Architect agree that this agreement represents the total agreement between them, and incorporates all prior written and oral understandings. Contractor and Architect further agree that clauses and provisions of this contract are to be severable from one another, and in the event that one or more clauses or provisions of this contract are declared illegal or otherwise invalid by a court of competent jurisdiction, that all other clauses and provisions of the contract that remain shall be of full force and effect.

Accepted by:

Accepted by:

Contractor's Representative Name

Architect's Representative Name

Date: _____

Date: _____

* * *

SAFETY & ENVIRONMENTAL PROCEDURES FOR HAZARDOUS MATERIALS

Section 01 35 43.13

1. GENERAL:

A. SUMMARY:

1. General: Provide Safety and Environmental Procedures for Hazardous Materials, as shown and specified per Contract Documents.
2. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Site Work: Refer to Section 02 50 00 - SITE REMEDIATION.

B. REFERENCES:

1. General: Refer to the Supplemental Special Provisions, "Greenbook" and "White Book".
2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced standard specifications.
3. State of California, Department of Industrial Relations (Cal/OSHA): Title 8, California Code of Regulations.
4. U. S. Environmental Protection Agency (EPA):
 - a. General: Laws and regulations.
 - b. 29 CFR 1910: Occupational Safety and Health Standards.
 - c. 29 CFR 1926: Safety and health regulations for Construction.
 - d. 40 CFR 261: Identification and Listing of Hazardous Waste.
 - e. 40 CFR 273: Standards for Universal Waste Management.
 - f. 49 CFR Parts 101, 106, 107, 171 to 180: The Transportation Safety Act, Hazardous Material Transportation Act.

C. SUBMITTALS:

1. General: Submit Site Safety and Health Plan for review, illustrating compliance with State and Federal requirements. On-site monitoring shall not begin until review is complete and ready for implementation.
2. Safety and Health Plan:
 - a. General: Submit plan specifically for the site and the anticipated activities based on available information, site conditions and hazards.
 - b. Monitoring Plan: Identified hazards and hazards commonly associated with construction activities.
 - c. Plan Revisions: Revise and submit plan as conditions evolve and change.
3. Personal Injury and Property Damage:
 - a. General: Submit evidence of necessary protections for the prevention of damage, injury or loss to:
 - b. Persons on the site that may be affected by the work.
 - c. Materials and equipment to be incorporated into the work.
 - d. Other property at or adjacent to the site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and underground facilities not designated for removal, relocation or replacement.
4. Emergency Procedures:
 - a. General: Submit procedures to be followed in the event of critical conditions including but not limited to:
 - b. Significant breach in the containment barrier.
 - c. Identification of airborne contamination or debris outside of the containment area.
 - d. Splitting or spilling of waste containers en route to a waste vehicle.
 - e. Fire, electric shock, life threatening bodily injury inside or outside of the containment area.
5. Emergency Contact Information:
 - a. General: Submit contact names and telephone numbers for:
 1. Contractor's representative.
 2. Owner's representative
 3. Fire department.
 4. Police department.
 5. Local Hospital or emergency care.
 - b. Site Copy: Provide a copy of emergency contact information updated as required, on the site, available for inspection as necessary.
6. Contingency Planning:
 - a. General: Submit procedures to be followed should the following occur:
 - b. Work area containment breached.
 - c. Release of hazardous materials.

required.

D. ADMINISTRATIVE REQUIREMENTS:

1. Coordination:
 - a. General: Plan work to be executed in sequential phases, with inspection and approval of each phase prior to proceeding to the next phase.
 - b. Notifications and Approvals: Make required notifications to federal, state, and local authorities and comply with the provisions of permits required by the work specified.
 - c.
2. Project Meetings:

E. QUALITY ASSURANCE:

1. Qualifications:
 - a. General: Mitigation operations shall be overseen by a CalOSHA trained "Hazardous Waste Site Surveillance Supervisor".
 - b. Workmen: Mitigation operations shall be conducted by workmen trained as a "Hazardous Wastes Construction Worker" for the type of mitigation required.

2. PRODUCTS:

- A. GENERAL: Refer to Section 02 50 00 - SITE REMEDIATION.

3. EXECUTION:

A. PREPARATION:

1. General: Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
2. Signage: Prior to the preparation of site for work activities involving hazardous materials, place warning signs immediately outside the site entrance, and at all exposed sides of the site, warning that mitigation related work is being conducted. Provide signs at least 20 inches by 14 inches, written in both English and Spanish, and with bold letters not smaller than 2 inches tall to read: "WARNING: HAZARD REMOVAL AREA - UNAUTHORIZED ENTRY PROHIBITED".

B. PERFORMANCE:

1. General: Refer to Section 02 50 00 - SITE REMEDIATION.
2. Closeout: General construction of new facility shall not commence until final testing and clearance is completed, necessary approvals granted, and notice to proceed authorized by the City Representative.

* * *

REFERENCES

Section 01 42 00

1. GENERAL:

A. SUMMARY

1. Description:
 - a. General: Standards, codes, definition of words and terms, are identified in this Section.
 - b. Additional Instructions: Refer to 00 01 08 - USER GUIDE FOR THE PROJECT MANUAL.
2. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Quality Standards: Refer to Section 01 43 00 - QUALITY ASSURANCE.

B. REFERENCES:

1. General: References are made throughout the technical specifications to various standard specifications, codes, practices, and requirements for materials, work quality, installation, inspections and tests, which are published and issued by the organizations, societies and associations listed below by abbreviation and name.
2. Referenced Standards: Obtain copies direct from publication sources as needed for proper performance and completion of the Work. Addresses for these organizations are available from the Architect.

C. STANDARDS: All references to established Standards mean and include the latest edition of such Standards, as of the date of issue of this Project Manual.

D. CODES:

1. General: Work of this project shall conform to applicable codes, current editions with applicable amendments, as adopted by enforcing agencies.
2. Applicable Codes:
 - a. California Building Code (CBC):
 1. General: California Building Standards Commission.
 2. Building Standards Administrative Code: Title 24, Part 1.
 3. Building Code: Volume 1 and 2; Title 24, Part 2, Volume 1 and 2.
 4. Electrical Code: Title 24, Part 3.
 5. Mechanical Code: Title 24, Part 4.
 6. Plumbing Code: Title 24, Part 5.
 7. Energy Code: Title 24, Part 6.
 8. Elevator Construction Safety Code: Title 24, Part 7.
 9. Fire Code: Title 24, Part 9.
 10. Green Building Standards Code: Title 24, Part 11.
 11. Referenced Standards Code: Title 24, Part 12.
 3. Americans with Disabilities Act (ADA): Latest edition; Civil Rights Division, Office on the Americans with Disabilities Act, U.S. Department of Justice
 4. National Fire Protection Association (NFPA): Life Safety Code - NFPA 101.
 - a. U. S. Environmental Protection Agency (EPA): Laws and regulations.
 - b. California Environmental Protection Agency (CalEPA): State regulations and standards.
 - c. California Integrated Waste Management Board:
 1. General: Sustainable Building Guidelines.
 2. Construction Waste Management: Construction and Demolition Debris Recycling.
 - d. California State Water Resources Control Board (SWRCB): SWPPP Standards.
 - e. Public Utilities: Rules, regulations and standards of jurisdictional agencies.

E. DEFINITIONS:

1. Words and Terms:
 - a. General: The following are used in addition to those defined in the General Conditions, and are defined as follows:
 - b. Accepted Equal: Reviewed and accepted by the City's Representative as being equal in quality, utility and appearance.
 - c. Approved: As accepted by the City's Representative.
 - d. As Required: As required by regulatory requirements, referenced standards, existing conditions, or by the Contract Documents.
 - e. Directed: As instructed by the City's Representative in writing.
 - f. Furnish: Supply and deliver to the site.
 - g. Indicated: As shown, noted, or scheduled on the Drawings.
 - h. Install: Anchor, fasten, or connect in place and adjust for use; place or apply in proper position and location; establish in place for use or service.
 - i. Provide: Furnish and install.
 - j. Site: Area to be occupied by the Project. Use of the word "jobsite" or "site" shall be interpreted to be synonymous with "site of the Work" or "Work Site".

2. Abbreviations:
 - a. General: Definition of abbreviations and symbols used on the Drawings are identified on the Drawings.
 - b. Governing Dictionary: The definitions of words and abbreviations used in these Specifications are given in "The American Heritage Dictionary of the English Language".

2. PRODUCTS:

- A. GENERAL: The reference standards applicable to this Project are specifically identified in the technical specification Sections listed in the Table of Contents - Divisions 02 through 33.
- B. ASSOCIATION AND AGENCY NAMES: The following abbreviation or acronym shall be understood to mean the full name of the respective organization or document, as follows:

A

American Association of Automatic Door Manufacturers (AAADM)
Aluminum Association (AA)
Associated Air Balance Council (AABC)
Aluminum Anodizers Council (AAC)
American Architectural Manufacturers Association (AAMA)
Association of Asphalt Paving Technologists (AAPT)
American Association of Radon Scientists and Technologists (AARST)
American Association of State Highway and Transportation Officials (AASHTO)
American Association of Textile Chemists and Colorists (AATCC)
Amateur Athletic Union (AAU)
American Association of Wood Turners (AAW)
American Boiler Manufacturers Association (ABMA)
American Coal Ash Association (ACAA) American Copper Council (ACC)
Air Conditioning Contractors Association (ACCA)
American Consulting Engineers Council (ACEC)
American Concrete Institute (ACI)
American Construction Inspectors Association (ACIA)
American Council of Independent Laboratories (ACIA)
American Concrete Pavement Association (ACPA)
American Concrete Pumping Association (ACPA)
American Concrete Pipe Association (ACPA)
American Concrete Pressure Pipe Association (ACPPA)
Americans with Disabilities Act (ADA)
Art Dealers Association of America (ADAA)
Air Diffusion Council (ADC)
Air Distribution Institute (ADI)
American Extruders Council (AEC)
Audio Engineering Society (AES)
Automatic Fire Alarm Association (AFAA)
American Fence Association (AFA)
American Fiberboard Association (AFA)
American Floorcovering Alliance (AFA)
Anti-Friction Bearing Manufacturers Association (AFBMA)
Association for Facilities Engineering (AFE)
American Furniture Manufacturers Association (AFMA)
American Forest and Paper Association (AFPA)
American Fire Sprinkler Association (AFSA)
American Galvanizers Association (AGA)
American Gas Association (AGA)
Art Glass Association (AGA)
Associated General Contractors of America (AGC)
Automated Guided Vehicle Systems Section of the Material Handling Institute (AGVS)
Association of Home Appliance Manufacturers (AHAM)
American Hardwood Export Council (AHEC)
American Hardware Manufacturers Association (AHMA)
Appalachian Hardwood Manufacturers Association (AHMA)
Asphalt Institute (AI)
American Institute of Architects (AIA)
American Insurance Association (AIA)
American Industrial Hygiene Association (AIHA)
American Institute of Steel Construction (AISC)
American Iron and Steel Institute (AISI)
American Institute of Timber Construction (AITC)

Attachment E - Technicals

Volume 1 of 2 (Rev. May 2015)

American Lighting Association (ALA)
Associated Landscape Contractors of America (ALCA)
American Ladder Institute (ALI)
Associated Locksmiths of America (ALOA)
American Lumber Standards Committee, Inc. (ALSC)
Air Movement and Control Association International, Inc. (AMCA)
Architectural Metal Products Division of NAAMM (AMP)
American Nursery and Landscape Association (ANLA)
American National Standards Institute (ANSI)
American Planning Association (APA)
The Engineered Wood Association (APA)
American Portland Cement Alliance (APCA)
American Pipe Fitters Association (APFA)
American Petroleum Institute (API)
American Park and Recreation Society (APRS)
American Public Works Association (APWA)
American Rolling Door Association (ARDA)
Association of Refrigerant and Desuperheating Manufacturers (ARDM)
Air-Conditioning and Refrigeration Institute (ARI)
Asphalt Roofing Manufacturers Association (ARMA)
Asphalt Recycling and Reclaiming Association (ARRA)
American Road and Transportation Builders Association (ARTBA)
Air-conditioning and Refrigeration Wholesalers International (ARWI)
Acoustical Society of America (ASA)
Adhesive and Sealant Council (ASC)
Alliance to Save Energy (ASE)
American Society of Consulting Arborists (ASCA)
American Society of Concrete Contractors (ASCC)
American Society of Civil Engineers (ASCE)
American Society of Furniture Designers (ASFD)
American Society of Golf Course Architects (ASGCA)
American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
American Society of Interior Designers (ASID)
American Society of Landscape Architects (ASLA)
American Society of Mechanical Engineers (ASME)
American Society of Plumbing Engineers (ASPE)
American Society of Interior Designers (ASID)
Automated Storage/Retrieval Systems (AS/RS)
American Society of Sanitary Engineering (ASSE)
American Society for Testing and Materials (ASTM)
Alliance for Telecommunications Industry Solutions (ATIS)
American Textile Manufacturers Institute (ATMI)
Association of Vacuum Equipment Manufacturers (AVEM)
Association of Wall and Ceiling Industries-International (AWCII)
Association of Woodworking and Furnishings Suppliers (AWFS)
Architectural Woodwork Institute (AWI)
American Wood Preservers Association (AWPA)
American Wood Preservers Institute (AWPI)
American Welding Society (AWS)
American Water Works Association (AWWA)
American Zinc Association (AZA)

B

Bath Enclosure Manufacturers Association (BEMA)
Bare Granite Association (BGA)
Bureau of Home Furnishings and Thermal Insulation, State of California, Dept. of Consumer Affairs (BHFTI)
Builders Hardware Manufacturers Association (BHMA)
Brick Industry Association (BIA)
Business and Institutional Furniture Manufacturer's Association (BIFMA)
Building Owners and Managers Association International (BOMA)
Building Stone Institute (BSI)

C

Compressed Air and Gas Institute (CAGI)
California Occupational Safety and Health Administration (CalOSHA)
State of California, Department of Transportation (CalTrans)
Fire Station No. 2 (Bayside)
Attachment E - Technicals
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California Stormwater Quality Association (CASQA)
Color Association of the United States (CAUS)
Copper and Brass Fabricators Council (CBFC)
Copper and Brass Servicecenter Association (CBSA)
Certified Ballast Manufacturers (CBM)
Carpet Cushion Council (CCC)
Copper Development Association (CDA)
Conveyor Equipment Manufacturers Association (CEMA)
California Forestry Association (CFA)
Chemical Fabrics and Film Association, Inc. (CFFA)
Compressed Gas Association (CGA)
Ceiling and Interior Systems Construction Association (CISCA)
Cast Iron Soil Pipe Institute (CISPI)
Chain Link Fence Manufacturing Institute (CLFMI)
Construction Management Association of America (CMAA)
Composite Panel Association (CPA)
Concrete Pipe Association (CPA)
Ceramic Manufacturers Association (CMA)
Crane Manufacturers Association (CRA)
California Redwood Association (CRA)
Conference of Radiation Control Program Directors (CRPD)
Carpet and Rug Institute (CRI)
Custom Roll Forming Institute (CRFI)
Concrete Reinforcing Steel Institute (CRSI)
Concrete Foundations Institute (CFI)
Conference for Responsible Waste Incineration (CRWI)
Concrete Sawing and Drilling Association (CSDA)
Commercial Standard (CS), U.S. Department of Commerce
Conveyor Section of the Materials Handling Institute (CS)
Canadian Standards Association (CSA)
Central Station Alarm Association (CSAA)
Cast Stone Institute (CSI)
Construction Specifications Institute (CSI)
Chimney Safety Institute of America (CSIA)
California State Industrial Accident Commission (CSIAC)
U.S. Consumer Product Safety Commission (CPSC)
Cedar Shingle and Shake Bureau (CSCB)
Ceramic Tile Institute of America (CTI)
Composite Wood Council (CWC)

D

Door Access Systems Manufacturers Association International (DASMA)
Diesel Engine Manufacturers Association (DEMA)
Design Build Institute of America (DBIA)
Door Hardware Institute (DHI)
Ductile Iron Pipe Research Association (DIPRA)
Ductile Iron Society (DIS)
State of California, Division of the State Architect, Office of Regulation Services (DSA)

E

Expanded Clay Shale and Slate Institute (ECSSI)
Energy Communication and Electrical Association (ECEA)
Energy Efficient Lighting Association (EELA)
Institute of Electrical and Electronics Engineers (IEEE)
Electronic Industries Association (EIA)
Environmental Information Association (EIA)
EIFS Industry Manufacturers Association (EIMA)
Electrical Generating Systems Association (EGSA)
European Committee for Standardization (CEN)
Expansion Joint Manufacturers Association (EJMA)
Expanded Metal Manufacturers Association Division of NAAMM (EMMA)
Electric Power Supply Association (EPSA)
ETL Testing Laboratories (ETL)

F

Federal Communications Commission (FCC)
Fluid Controls Institute (FCI)
Floor Covering Installation Contractors Association (FCICA)
Forrest Certification Resource Center (FCRC)
Fire Equipment Manufacturers Association (FEMA)
Food Equipment Manufacturers Association (FEMA)
Flat Glass Marketing Association (FGMA) is now part of Glass Association of North America (GANA)
Forging Industry Association (FIA)
Factory Mutual Research and Engineering Corporation (FM) is now part of Intertec Testing Services (ITS)
Forrest Products Society (FPS)
Food Processing Machinery and Supplies Association (FPMSA)
Fabricators and Manufacturers Association International (FMA)
Forrest Resources Association (FRA)
Federal Specification - Generals Services Administration (FS)
Fire Suppression Systems Association (FSSA)

G

Gypsum Association (GA)
Gas Appliance Manufacturers Association (GAMA)
Golf Course Builders Association of America (GCBA)
Glass Association of North America (GANA)
Germany Institute for Standardization (GIS) - Deutsches Institut für Normung (DIS)

H

Hardwood Council (HC)
Heat Exchange Institute (HEI)
Home Furnishings Association International Association (HFIA)
Hydraulic Institute (HI)
Hollow Metal Manufacturers Association Division of NAAMM (HMMA)
Hardwood Manufacturers Association (HMA)
Hardwood Plywood and Veneer Association (HPVA)
U.S. Department of Housing and Urban Development (HUD)

I

International Association of Electrical Inspectors (IAEI)
International Association of Plumbing and Mechanical Officials (IAPMO)
International Association of Lighting Designers (IALD)
International Copper Association (ICA)
Insulation Contractors of America (ICAA)
Insulated Cable Engineers Association (ICEA)
International Concrete Repair Institute (ICRI)
International Cast Polymer Association (ICPA)
Interlocking Concrete Pavement Institute (ICPI)
International Compressor Remanufacturers Association (ICRA)
Independent Electrical Contractors (IEC)
International Erosion Control Association (IECA)
Institute of Electrical and Electronics Engineers (IEEE)
Illuminating Engineering Society of North America (IES)
International Electrical Testing Association (IETA)
Industrial Fasteners Institute (IFA)
Industrial Fabrics Association International (IFAI)
International Firestop Council (IFC)
Independent Forest Products Association (IFPA)
International Furnishings and Design Association (IFDA)
Independent Glass Association (IGA)
Insulating Glass Certification Council (IGCC)
Insulating Glass Manufacturers Alliance (IGMA)
International Ground Source Heat Pump Association (IGSHPA)
Industrial Heating Equipment Association (IHEA)
International Interior Design Association (IIDA)
Institute of Noise Control Engineering (INCE)
Indiana Limestone Institute of America (ILIA)
International Masonry Institute (IMI)
International Municipal Signal Association (IMSA)
Association of the Nonwoven Fabrics Industry (INDA)

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International Titanium Association (ITA)
Intertek Testing Services (ITS)
International Sign Association (ISA)
Instrument Society for Measurement and Control (ISA)
International Sanitary Supply (ISSA)
Insulated Steel Door Institute (ISDI)
International Standards Organization (ISO)
Iron and Steel Society (ISS)
International Slurry Surfacing Association (ISSA)
International Window Cleaning Association (IWCA)
International Window Film Association (IWFA)
International Wood Products Association (IWPA)

J

Joint Industry Board of the Electrical Industry (JIBEI)

K

Kitchen Cabinet Manufacturers Association (KCMA)

L

Lead Industries Association, Inc. (LIA)
Light Gage Steel Engineers Association (LGSEA)
Laminating Materials Association (LMA)
Loading Dock Equipment Manufacturers Association (LDEMA)
Lift Manufacturers Product Section of the Materials Handling Institute (LMP)
Lightning Protection Institute (LPI)
Lighting Research Center (LRC)
Laminators Safety Glass Association (LSGA) is part of Glass Association of North America (GANA)

M

Modular Building Institute (MBI)
Metal Building Manufacturers Association (MBMA)
Modular Building Systems Council (MBSC)
Metal Construction Association (MCA)
Masonry Contractors of America (MCAA)
Mechanical Contractors Association of America (MCAA)
Maple Flooring Manufacturers Association (MFMA)
Metal Framing Manufacturers Association (MFMA)
Material Handling and Management Society (MHMS)
Marble Institute of America (MIA)
Masonry Institute of America (MIA)
Metal Bar and Grating Division of NAAMM (MBG)
Masonry Society (MS)
Manufacturers Standardization Society of the Valve and Fittings Industry (MSSVFI)
Metal Treating Institute (MTI)

N

National Aggregate Association NAA)
National Arborist Association (NAA)
National Alarm Association of America (NAAA)
National Association of Architectural Metal Manufacturers (NAAMM)
National Antique and Art Dealers Association (NAADA)
North American Electric Reliability Council (NAERC)
North American Association of Food Equipment Manufacturers (NAAFEM)
North American Insulation Manufacturers Association (NAIMA)
North American Laminate Floor Association (NALFA)
National Association of Metal Finishers (NAMF)
National Association of Noise Control Officials (NANCO)
National Asphalt Pavement Association (NAPA)
National Association of Reinforcing Steel Contractors (NARSC)
National Association of Relay Manufacturers (NARM)
North American Steel Framing Alliance (NASFA)
National Association of Store Fixture Manufacturers (NASFM)
National Association of Vertical Transportation Professionals (NAVTP)
National Association of Women in Construction (NAWIC)
North American Wholesale Lumber Association (NAWLA)
National Board of Boiler and Pressure Vessel Inspectors (NBBPVI)
National Burglar and Fire Alarm Association (NBFAA)

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National Board of Fire Underwriters (NBFU) - See American Insurance Association (AIA)
National Blacksmith and Welders Association (NBWA)
National Collegiate Athletic Association (NCAA)
National Council of Acoustical Consultants (NCAC)
National Concrete Masonry Association (NCMA)
National Certified Pipe Welding Bureau (NCPWB)
National Clay Pipe Institute (NCPI)
National Council of Qualification for Lighting Professions (NCQLP)
National Council on Radiation Protection and Measurements (NCRPM)
National Corrugated Steel Pipe Association (NCSPA)
National Elevator Contractors Association (NECA)
National Elevator Industry, Inc. (NEII)
National Electrical Manufacturers Association (NEMA)
International Electrical Testing Association (NETA)
National Forestry Association (NFA)
Northwest Forestry Association (NFA)
National Frame Builders Association (NFBA)
National Fire Protection Association (NFPA)
National Fenestration Rating Association (NFRA)
National Fire Sprinkler Association (NFSA)
National Glass Association (NGA)
National Home Furnishings Association (NHFA)
National Hardwood Lumber Association (NHLA)
National Insulation Association (NIA)
National Institute of Steel Detailing (NISD)
National Institute of Standards and Technology (NIST)
National Kitchen & Bath Association (NKBA)
National Landscape Association (NLA)
National Lime Association (NLA)
Northwestern Lumber Association (NLA)
National Lighting Bureau (NLB)
National Lumber Grades Authority (NLGA)
Northeastern Lumber Manufacturers Association (NLMA)
National Metal Decorators Association (NMDA)
National Metal Spinners Association (NMSA)
National Oak Flooring Manufacturers Association (NOFMA)
National Ornamentation and Miscellaneous Metals Association (NOMMA)
National Particleboard Association (NPA) Division of the Composite Panel Association (CPA)
National Paint and Coatings Association (NPCA)
National Precast Concrete Association (NPCA)
National Refrigeration Contractors Association (NRCA)
National Roofing Contractors Association (NRCA)
National Roof and Deck Contractors Association (NRDA)
National Roofing Foundation (NRF)
National Ready-Mix Concrete Association (NRMCA)
National Stone Association (NSA)
National Sunroom Association (NSA)
National Sash and Door Jobbers Association (NSDJA)
National Sanitation Foundation International (NSF)
National Standard Plumbing Code Committee (NSPCC)
National Swimming Pool Foundation (NSPF)
National Stone, Sand and Gravel Association (NSSGA)
National Spa and Pool Institute (NSPA)
National Society of Professional Engineers (NSPE)
National School Supply and Equipment Association (NSSEA)
National Tile Contractors Association (NTCA)
National Terrazzo and Mosaic Association (NTMA)
National Wood Flooring Association (NWFA)

O

Occupational Safety and Health Administration (OSHA)
State of California, Office of Public School Construction (OPSC)
State of California, Office of Statewide Health Planning and Development (OSHPD)

P

Power Actuated Tool Manufacturers' Institute, Inc. (PATMI)
Fire Station No. 2 (Bayside)

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Portland Cement Association (PCA)
Power and Communication Contractors Association (PCCA)
Precast/Prestressed Concrete Institute (PCI)
Painting and Decorating Contractors of America (PDCA)
Plumbing and Drainage Institute (PDI)
Primary Glass Manufacturers Council (PGMC)
Plumbing-Heating-Cooling Contractors Association (PHCCA)
Polyisocyanurate Manufacturers Association (PIMA)
Precision Metalforming Association (PMA)
Project Management Institute (PMI)
Plumbing Manufacturers Institute (PMI)
Plastics and Metal Products Manufacturers Association (PMPMA)
Porcelain Enamel Institute (PEI)
Plastics Institute of America (PIA)
Plastic Pipe Institute (PPI)
Polyurethane Manufacturers Association (PMA)
Product Standard (PS), National Bureau of Standards
Portable Sanitation Association International (PSA)
Plastic Soft Materials Manufacturers Association (PSMMA)

Q

None

R

Rainforest Alliance (RA)
Roof Consultants Institute (RCI)
Roof Coating Manufacturers Association (RCMA)
Refrigeration Engineers and Technicians Association (RETA)
Resilient Floor Covering Institute (RFCI)
Reflective Insulation Manufacturers Association (RIMA)
Redwood Inspection Service (RIS) Division of the California Redwood Association (CRA)
Rubber Manufacturers Association (RMA)
Refractory Metals Association (RMA)
Rack Manufacturers Institute (RMI)
Roof Tile Institute (RTI)

S

Scientific Apparatus Makers Association (SAMA)
Society of American Registered Architects (SARA)
Specifications Consultants in Independent Practice (SCIP)
Southern Cypress Manufacturers Association (SCMA)
Scientific Certification Systems (SCS)
Steel Deck Institute (SDI)
Steel Door Institute (SDI)
Steel Erectors Association of America (SEAA)
Structural Engineering Institute (SEI)
State of California, State Fire Marshal (SFM)
Society of Fire Protection Engineers (SFPE)
Stained Glass Association of America (SGAA)
Safety Glazing Certification Council (SGCC)
Society of Glass and Ceramic Decorators (SGCD)
Structural Insulated Panel Association (SIPA)
Security Industry Association (SIA)
Scaffolding Industry Association (SIA)
Society for Information Display (SID)
Sealed Insulating Glass Manufacturers Association (SIGMA)
Steel Joist Institute (SJI)
Southeastern Lumber Manufacturers Association (SLMA)
Screen Manufacturers Association (SMA)
Stucco Manufacturers Association (SMA)
Steel Manufacturers Association (SMA)
Storage Equipment Manufacturers Association (SMA)
Shelving Manufacturers Association (SMA)
Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
Southern Pine Council (SPC)
Society of Plastics Engineers (SPE)
Fire Station No. 2 (Bayside)

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Steel Plate Fabricators Association (SPFA)
Southern Pine Inspection Bureau (SPIB)
Single-Ply Roofing Institute (SPRI)
Specialty Steel Industry of North America (SSINA)
Steel Stud Manufacturers Association (SSMA)
Steel Structures Painting Council (SSPC)
Sump and Sewage Pump Manufacturers Association (SSPMA)
Steel Tank Institute (STI)
Steel Tube Institute of North America (STINA)
Steel Window Institute (SWI)
Submersible Water Pump Association (SWPI)
Sealant, Waterproofing and Restoration Institute (SWRI)

T

Tilt-up Concrete Association (TCA)
Tile Council of North America (TCNA)
Turf and Ornamental Communicators Association (TOCA)
Turfgrass Producers Council (TPC)
Tube and Pipe Association International (TPA/FMA)
Truss Plate Institute (TPA)

U

Underwriters Laboratories, Inc. (UL)
United Lightning Protection Association (ULPA)
Uni-Bel PVC Pipe Association (UNI)
U.S. Department of Agriculture (USDA), Forest Products Laboratory
U.S. Consumer Products Safety Commission (CPSC)
U.S. Green Building Council (USGBC)
U.S. Environmental Protection Agency (USEPA)
U.S. General Services Administration (USGSA)
U.S. National Committee of the International Commission on Illumination (USNC/CIE)
United States Sign Council (USSC)
United States Pharmacopoeial Convention (USP)
United States Tennis Court and Track Builders Association (US&TCBA)

V

Valve Manufacturers Association of America (VMA)
Vinyl Siding Institute (VSI)

W

Wallcoverings Association (WA)
West Coast Lumber Inspection Bureau (WCLIB)
Window Covering Manufacturers Association (WCMA)
Window and Door Manufacturers Association (WDMA)
Women Construction Owners and Executives U.S.A. (WCOE)
Wire Fabricators Association (WFA)
World Forrest Association (WFA)
World Floorcoverings Association (WFCA)
Western Hardwood Association (WHA)
Western Wall and Ceiling Contractors Association (WWCCA)
Wiring Harness Manufacturers Association (WHMA)
Woodwork Institute (WI)
Warnock Hersey, Inc. (WH) is now part of Intertec Testing Services (ITS)
Wood Molding and Millwork Producers Association (WWMPA)
Wood Products Manufacturers Association (WPMA)
World Squash Federation (WSF)
Western Red Cedar Lumber Association (WRCLA)
Wire Reinforcement Institute (WRI)
Water Systems Council (WSC)
Western States Clay Products Association (WSCP)
Wood and Synthetic Flooring Institute (WSFI)
Western States Roofing Contractors Association (WSRCA)
Wood Truss Council of America (WTCA)
Western Wood Products Association (WWPA)
Woven Wire Products Association (WWPA)
Fire Station No. 2 (Bayside)
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X

None

Y

None

Z

None

3. EXECUTION:
Not Used

* * *

QUALITY ASSURANCE

Section 01 43 00

1. GENERAL:

A. DESCRIPTION:

1. General: This section includes administrative and procedural requirements for quality assurance.
2. Workmanship: Quality of work.
3. Tolerances: Finished surfaces.
4. Protection of Wood: Moisture and damage.

B. REFERENCES:

1. General: Refer to Section 01 42 00 - REFERENCES. Products or workmanship specified in the Project Manual by association, trade, or other consensus standards shall conform to the requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
2. Contractual Relationship: The contractual duties and responsibilities of the parties of the Contract and those of the Architect shall not be altered from the requirements of the Contract Documents by any statement or inference in any reference document.

C. TESTING: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.

2. PRODUCTS:

- #### A. GENERAL: Refer to Section 01 60 00 - PRODUCT REQUIREMENTS assure a consistent quality of products furnished by suppliers and manufacturers as indicated throughout the Project Manual.

3. EXECUTION:

A. PERFORMANCE

1. General: Refer to Section 01 73 10 - EXECUTION REQUIREMENTS.
2. Workmanship: Perform shop and field work with mechanics, craftspersons, artisans, and workers skilled and experienced in the fabrication and installation of work specified. Install and erect work plumb, level, square, and true, or true to indicated angle, and in proper alignment and relationship to other work. Finished work shall be free from defects and damage. Quality of work shall conform to the highest established standards and practices of the various trades required. The City's Representative reserves the right to reject materials and work quality which does not meet accepted standards. Repair or replace substandard material or work as directed, at no additional cost to the City.

B. INSTALLATION

1. General: Conduct quality control in concert with suppliers, products, services, site conditions, and workmanship, to produce work of specified quality.
2. Manufacturer's Instructions:
 - a. General: Follow manufacturer's instructions, including each step in progression of installation. If manufacturer's instructions conflict with Contract Documents, request clarification from the City's Representative before commencing Work.
 - b. Installer: Manufacturer approved, as required in the technical sections of the Project Manual.
 - c. Field Services: Coordinate with manufacturer of a product, system, or assembly which requires special knowledge and skill for proper application/installation of the product, system, or assembly to obtain field service, consultation and inspection as required for the application/installation work at no additional cost to the City.
3. Reference Standards: Conform to specified standards as minimum quality for the Work except where more stringent codes or specified requirements indicate higher standards or more precise workmanship.
4. Anchorage: Secure products in place with positive anchorage devices designed and sized to withstand stress, vibration, physical distortion, or disfigurement.
5. Tolerances:
 - a. General: Adjust products to appropriate dimensions; position before securing in place. Monitor and control tolerances of installed products to produce acceptable Work.
 - b. Finished Wall Surfaces: Plumb; maximum variation of 1/8 inch in 8'-0" when a straightedge is laid on the surface in any direction, and no measurable variation in any 2'-0" direction.
 - c. Finished Ceiling Surfaces: True and level; maximum variation of 1/8 inch in 8'-0" when a straightedge and water level are laid on the surface in any direction, and no measurable variation in any 2'-0" direction.
 - d. Floor Surfaces:
 1. Concrete Floors: Tolerances for concrete floors and pavement are specified in Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 2. Finished Floors: Level to within plus or minus 1/8 inch in 10'-0" for resilient floor coverings.

6. Protection of Wood:
 - a. General: Provide protection of wood materials and products, whether or not installed, from water and moisture until completion and acceptance of the Project. Keep informed of weather conditions and forecasts and, when there is a likelihood of rain, protect installed and exposed framing and sheathing and stored lumber exposed to the elements with suitable water-repellent coverings, such as canvas/tarpaulins or polyethylene sheeting.
 - b. Finish Materials: Keep millwork and trim, paneling, cabinets, shelving, and products manufactured from wood under cover and dry at shop until time of delivery. Do not deliver fabricated finish materials to the site until the building is roofed, and exterior walls are sheathed and protected with building paper as a minimum, the doors and windows are installed and glazed, and there is ample interior storage space for such materials and products. Do not deliver during periods of rain or heavy fog.
 - c. Moisture Damage: Wood materials or products which become wet from rain, dew, fog, or other source will be considered to have moisture damage and will be rejected, requiring replacement by the Contractor with new, dry materials or products at no additional cost.

* * *

TESTING AND INSPECTION SERVICES

Section 01 45 23

1. GENERAL:

- A. DESCRIPTION: This section includes administrative and procedural requirements for testing laboratory services for inspections, tests, and related actions, including reports prepared by Contractor, by independent agencies, and by governing authorities. Contract enforcement activities performed by the City's Representative are not included.
- B. TESTING LABORATORY:
 - 1. General: The Contractor shall employ and pay for services of an independent testing laboratory to perform specified testing. Testing laboratory shall be approved by the City's Representative.
 - 2. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.
 - 3. Cooperation: Cooperate with laboratory to facilitate required services.
 - 4. Performance of Work: Employment of laboratory shall not relieve Contractor's obligations to perform work of Contract.
- C. REQUIREMENTS:
 - 1. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
 - 2. Respective Sections of the Specifications: Certification of products.
 - 3. Listed Specification Sections: Laboratory tests required and standards for testing.
 - 4. Testing Laboratory Inspection, Sampling and Testing is required for:
 - a. Concrete Reinforcement: Section 03 20 00 - CONCRETE REINFORCING.
 - b. Cast-in-Place Concrete: Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 - c. Concrete Unit Masonry: Section 04 22 00 - CONCRETE UNIT MASONRY.
 - d. Structural Steel: Section 05 12 00 - STRUCTURAL STEEL FRAMING.
 - e. Applied Fireproofing: Section 07 81 00 - APPLIED FIREPROOFING.
 - f. Glazed Aluminum Curtain Wall: Section 08 44 13 - GLAZED ALUMINUM CURTAIN WALL.
 - g. Earthwork: Section 31 20 10 - EARTHWORK.

2. PRODUCTS:

- A. SUBMITTALS:
 - 1. General: Refer to Section 01 33 10 - SUBMITTALS.
 - 2. Testing Laboratory: Submit electronic copy (PDF) of certified written report, of each inspection, test, or similar service.

3. EXECUTION:

- A. LABORATORY DUTIES:
 - 1. General: Comply with ASTM E329 "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".
 - 2. Cooperation: Cooperate with the City's Representative, Engineer and Contractor; provide qualified personnel after due notice.
 - 3. Services:
 - a. General: Perform specified inspections, sampling and testing of materials and methods of construction.
 - b. Specified Standards: Verify compliance.
 - c. Specified Materials: Ascertain compliance with requirements of Contract Documents.
 - 4. Notification: Promptly inform the City's Representative and Engineer of observed irregularities or deficiencies of work or products.
 - 5. Reports: Submit as required.
 - 6. Additional Testing: Perform additional tests as required by the City's Representative.
- B. LIMITATIONS OF AUTHORITY OF TESTING LABORATORY: Laboratory is not authorized to release, revoke, alter or enlarge on requirements of Contract Documents, or perform any construction duties of Contractor.
- C. CONTRACTOR'S RESPONSIBILITIES:
 - 1. Cooperation:
 - a. Scheduling: Notify laboratory sufficiently in advance of operations, as specified under individual Sections of the specifications, to allow laboratory to schedule tests and assign personnel. When tests or inspections cannot be performed after such notice, reimburse City for laboratory personnel and travel expenses incurred.
 - b. Laboratory Personnel: Cooperate with, provide access to Work, and to manufacturer's operations.
 - Inspector: Cooperate with Inspector to secure and deliver to laboratory adequate quantities

- of representative samples of materials proposed for use and that require testing.
2. Manufacturer's Test Reports: Furnish copies of products test reports as required.
 3. Incidental Labor and Facilities: Provide access to Work to be tested; facilitate inspections and tests.
 4. Additional Testing: Paid for by City and backcharged to Contractor as specified in the individual sections.
 5. Repair and Protection: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Refer to Section 01 73 29 - CUTTING AND PATCHING.

* * *

TEMPORARY FACILITIES AND CONTROLS Section 01 50 00

1. GENERAL:

- A. DESCRIPTION: Furnish and install temporary facilities and controls as specified, plus other unspecified temporary facilities, including labor, materials, services, utilities, and equipment, as may be required for proper performance of the contract, except as otherwise provided.
- B. RELATED WORK SPECIFIED ELSEWHERE:
 - 1. Earthwork: Section 31 20 10 - EARTHWORK.
 - 2. Permanent Utilities: Pertinent specification Sections.
- C. REQUIREMENTS OF REGULATORY AGENCIES:
 - 1. General: Temporary facilities and controls shall be approved by appropriate authorities and regulatory agencies, including insurance companies, for safety precautions, operation and fire hazard.
 - 2. City of San Diego: Jurisdictional requirements.
 - 3. Associated General Contractors of America (AGC): "Manual of Accident Prevention in Construction".
 - 4. California Occupational Safety and Health Administration (CalOSHA): Construction Safety Orders; 29 CFR, PART 1926 Safety and Health Regulations for Construction.
 - 5. California Division of Occupational Safety and Health (DOSH): Title 8 - Construction Safety Orders.
- D. PRODUCT HANDLING:
 - 1. Protection: Protect and maintain temporary facilities and controls in proper and safe condition throughout progress of work.
 - 2. Replacements: Immediately repair or replace lost or damaged temporary facilities or controls.

2. PRODUCTS:

- A. TEMPORARY UTILITIES: Provide water, electricity, gas and other specified utility services required during construction and extend service lines to construction areas; allow use by all trades.
 - 1. Temporary Water:
 - a. General: Provide and pay for ample supply of potable water from sources off site.
 - b. Temporary Connections: Provide connections to source and sufficient hose or pipe to carry water to all required locations.
 - 2. Temporary Electrical Facilities:
 - a. General: Provide temporary electrical power and facilities necessary to supply lighting for work operations and power for power driven tools and testing.
 - b. Construction Requirements:
 - 1. General: Construct and maintain temporary electrical facilities per requirements of the utility company providing service. Provide electrical materials, devices, and equipment that are in good and safe condition as follows:
 - 2. Division of Industrial Safety: "Electrical Safety Orders".
 - 3. Public Utilities Commission: "Rules for Overhead Line Construction".
 - c. Electrical Service: City will provide temporary power free of charge from existing outlets, as shown.
 - d. Interior Lighting: Provide and maintain at a minimum level of two (2) watts per square foot, as required.
 - 3. Temporary Heat and Ventilation:
 - a. General: Provide heat and ventilation as required to protect work and materials and reduce humidity to extent required to prevent corrosion of metal, dampness or mildew that may damage materials and finishes; fuel, equipment and method of heating and ventilating shall be acceptable to the City's Representative.
 - b. Finishing: Provide heat to produce temperature of not less than 70° F for seven (7) days prior to placement of interior finish materials and throughout period of installation of gypsum board, laying of resilient flooring materials, and painting.
 - c. Acceptance: Maintain building temperature of not less than 60° F after finishing is complete and until final acceptance or occupancy by City.
 - 4. Telephone:
 - a. General: Maintain telephone in field office for the use of the Contractor, and a separate telephone for the use of the City's Representative and Inspectors for duration of operations under this Contract. Provide and pay service charges for a cellular telephone and/or pager for use of Contractor's Superintendent.
 - b. Availability: Provide access to telephone service for subcontractors and suppliers for duration of construction.
 - c. Facsimile Machine (FAX): Provide acceptable telecopier device; provide access as necessary to expedite construction.

- d. Internet Access: Provide both high-speed and wireless internet access and e-mail capability at the job site.
- B. FIELD OFFICE:
 1. General: Provide acceptable construction trailer or temporary construction with floor raised above grade; waterproof, weathertight, and well lit and ventilated. Provide separate space within the trailer for the CM, with door that is lockable. Equip field office with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Office and equipment is the property of the Contractor and must be removed from the site upon completion of work.
 2. Utilities: Provide electric lighting and power; make adequate provisions for heating and cooling.
- C. SANITARY FACILITIES:
 1. Toilet Facilities: Provide enclosed chemical toilets with urinal for use of personnel engaged on Project.
 2. Drinking Water Facilities: Provide adequate clean and sanitary drinking water.
- D. CONSTRUCTION EQUIPMENT:
 1. General: Erect, equip, operate, and maintain construction equipment per applicable statutes, laws, ordinances, rules, and regulations of jurisdictional authorities and insurance companies regarding safety, operation and fire hazard.
 2. Construction Access Equipment:
 - a. General: Provide and maintain scaffolding, staging, runways, and similar equipment, as required. Coordinate furnishing and use with subcontractors.
 - b. Vertical Transportation: Provide and maintain hoists and construction elevators, including elevators for workmen; complete with operators, power and signals, as required;]per Safety Orders of State of California, Division of Industrial Safety, until work is completed or until no longer required under this Contract.
- E. ENCLOSURES, FENCING AND BARRICADES:
 1. General: Provide and maintain barricades, fencing, shoring, pedestrian walkways including lights and other safety precautions to guard against personal injury and property damage as prescribed by jurisdictional authorities, including insurance companies.
 2. Construction Fence: Developer shall install a construction fence pursuant to specifications of, and a permit from, the City Engineer. The fence shall be solid plywood with wood framing, painted a consistent color with the project's design, and shall contain a pedestrian passageway, signs, and lighting as required by the City Engineer. The fencing shall be maintained in good condition and free of graffiti at all times.
 3. Safety Orders: Obtain copies and conduct work under the requirements of applicable Safety Orders issued by State of California, Division of Industrial Safety. Inform subcontractors and material suppliers as to the requirements of applicable Safety Orders.
 4. Contractor's Storage Area: Locate where shown; enclose with fences and gates as required for security.
- F. TEMPORARY SIGNS:
 1. Project Sign: Refer to General Provisions.
 2. Other Signs: Not permitted; Contractor's name may be placed on field office and equipment.
- G. SITE CONTROLS AND PARKING:
 1. Entrance to Work Site: Use identified entrances and access roads, as shown, or as directed. Maintain roads in satisfactory condition during Contract; repair damage resulting from work of this Project, as required, to leave in condition equal to that existing at start of Work.
 2. Site Storage and Work Areas: On-site storage and work areas will be identified by the City's Representative, for the Contractor's use, subject to change as necessary as job progresses.
 3. Regulations: Observe and comply with rules and regulations in effect at occupied facilities, including parking and traffic regulations, security restrictions, hours of access, and the like.
 4. Use of Public Sidewalks and Streets: Make arrangements with civic authorities for temporary use of streets and sidewalks for offices, shops, storage, etc.; abide by rules, regulations and ordinances; obtain and pay fees for permits.
 5. Debris Control: Keep work and storage areas clean and free of debris. Dispose of debris off site as it accumulates; pay required fees for use of dumps. Burning or burying on site is prohibited.
 6. Dust Controls:
 - a. Indoor Operations: Control dust by using temporary partitions, curtains, or other means to prevent its spread beyond immediate work area. Use temporary means of closure for ducts and other openings communicating with other parts of building.
 - b. Outdoor Operations: Use sprayed water to control dust from outdoor operations, as required.
 7. Noise Control: Minimize noise caused by work operations. To extent possible, schedule accomplishment of noisy construction operations to hours during which adjacent building occupants will be least inconvenienced. Confine Work to hours specified in Construction Contract.
 8. Dewatering Facilities: Provide and maintain pumping facilities to keep site reasonably dry; protect materials and installed work from water damage until dewatering is no longer required.

- Repair damage to Work and replace materials lost due to vandalism or theft.
10. Drainage: As required by the State of California Water Resources Control Board, only rainwater is permitted in storm drain system. Do not permit water resulting from washing of equipment or other construction activities to be discharged into the storm drainage system. Provide temporary containment, sediment traps, and/or gravel filters to prevent discharge of non-storm water into storm drain system.

3. EXECUTION:

- A. MAINTENANCE AND REMOVAL: Maintain temporary facilities and controls as long as required for safe and proper completion of Work; remove temporary facilities and controls as rapidly as progress of Work will permit.

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PRODUCT REQUIREMENTS

Section 01 60 00

1. GENERAL:

A. DESCRIPTION:

1. General: This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
2. Submittals: Product lists.
3. Quality Assurance: References, source limitations, compatibility of options and nameplates.
4. Product Options: Products specified by reference standards, specified products, alternate manufacturers, accepted equals, and required products.
5. Product Handling: Procedures.

B. RELATED WORK:

1. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
2. Allowances and Alternates: Refer to Section 01 02 50 - MEASUREMENT AND PAYMENT.
3. Closeout: Refer to Section 01 77 00 - CLOSEOUT PROCEDURES.

C. DEFINITIONS:

1. Products:
 - a. General: Items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - b. Named Products: Items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
2. Materials: Components shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. Equipment: Product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

D. SUBMITTALS:

1. General: Refer to Section 01 33 10 - SUBMITTALS.
2. Products List: Within thirty-five (35) days after award of contract, submit complete list of products intended for use on this Project. Provide list tabulated by Section Number, giving the trade name, name of the manufacturer, and model number or catalog designation of each product. Include products specified by reference standards and alternate products proposed for substitution.

E. QUALITY ASSURANCE:

1. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
2. Reference Standards: Refer to Section 01 42 00 - REFERENCES.
3. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
4. Compatibility of Options: When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
5. Nameplates:
 - a. General: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
 - b. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 - c. Equipment: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces.

2. PRODUCTS:

A. GENERAL: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

B. PRODUCT OPTIONS:

1. General: For purposes of this Project, and in satisfaction of the requirements of the California Public Contract Code, products have been specified with the following options:
2. Products Specified by Reference Standards: Contractor may select any product which meets the standards, by any manufacturer.
3. Specified Products and Alternate Manufacturers: Wherever catalog numbers and specific brand or trade names are used in conjunction with a designated material, product, thing or service mentioned in these specifications, they are used to establish the standards of quality, utility and appearance required. The "specified product" shall be understood to be the basis for the project

design. Comparable products of named "alternate manufacturers" shall be considered equal in quality, utility and appearance. Contractor has the option of selecting from products and manufacturers named and must satisfy submittal requirements specified in Section 01 33 10 - SUBMITTALS.

4. Accepted Equal: Where specification includes the designation "or accepted equal", Contractor may request acceptance as "equal" any material, process, or product of unnamed manufacturer through use of the Substitution Request specified in Section 01 25 00 - SUBSTITUTION PROCEDURES. Requirements of that Section must be satisfied. Acceptance as "equal" will be the decision of the City's Representative; if the material, process or product is not, in the opinion of the City's Representative, equal in quality, utility and appearance to that specified, Contractor must furnish material, process or product specified.
5. Required Products: Where use of one named product and manufacturer is required to match others in use or because only one brand or trade name is known, there is no option, and no substitution will be allowed.

3. EXECUTION:

- A. GENERAL: Refer to Section 01 73 10 - EXECUTION REQUIREMENTS.
- B. PRODUCT HANDLING: Assure that Work is manufactured and/or fabricated in ample time so as to not delay construction progress. Transport, handle, store and protect products in accordance with manufacturer's instructions.

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OWNER FURNISHED PRODUCTS

Section 01 64 00

1. GENERAL:

- A. DESCRIPTION: The City will procure and furnish certain products for installation as shown and specified per Contract Documents.
- B. DEFINITIONS:
 - 1. General:
 - a. Furnish: Supply and deliver to the site.
 - b. Install: Anchor, fasten, or connect in place and adjust for use; place or apply in proper position and location; establish in place for use or service.
 - c. Provide: Furnish and install.
 - 2. Abbreviations: The following are used to identify products as noted on the Drawings.
 - a. CityFurnished Contractor Installed (O.F.C.I.): Products or equipment furnished by the Owner for installation under this contract.
 - b. Owner Furnished Owner Installed (O.F.O.I.): Products or equipment to be provided and installed by the Owner, but requiring surfacing, backing, utility connections or other preparation under this contract, for proper installation.
 - c. Not in Contract (N.I.C.): Products or equipment to be provided and installed by others, not requiring surfacing, backing, utility connections or other preparation under this contract.

2. PRODUCTS:

- A. OWNER FURNISHED PRODUCTS:
 - 1. General: For specified products furnished and paid for by the City, refer to the following:
 - a. Residential Appliances: Section 11 31 00 - RESIDENTIAL APPLIANCES.
 - 2. Products Furnished or Provided by Owner: Refer to Section 01 11 00 - SUMMARY OF WORK.

3. EXECUTION:

- A. OWNER'S RESPONSIBILITIES:
 - 1. Submittals: Arrange for and deliver necessary shop drawings, product data and samples to Contractor.
 - 2. Delivery:
 - a. General: Arrange and pay for product delivery to site, in accordance with construction schedule.
 - b. Bill of Materials: Deliver supplier's documentation to Contractor.
 - c. Inspection: Inspect jointly with Contractor.
 - d. Claims: Submit for transportation damage and replacement of otherwise damaged, defective, or missing items.
 - 3. Guarantees: Arrange for manufacturer's warranties, bonds, service, inspections, as required.
- B. CONTRACTOR'S RESPONSIBILITIES:
 - 1. Submittals: Review shop drawings, product data and samples and submit to the City's Representative with notification of any discrepancies or problems anticipated in use of product.
 - 2. Delivery:
 - a. General: Designate delivery date for each product in Progress Schedule.
 - b. Receiving: Receive and unload products at site. Handle products at site, including uncrating and storage.
 - c. Inspection: Promptly inspect products jointly with City; record shortages, damaged or defective items.
 - d. Storage: Protect products from damage or exposure to elements.
 - 3. Installation:
 - a. General: Assemble, install, connect, adjust and finish products, as stipulated in the respective section of Specifications.
 - b. Damages: Repair and replace items damaged during handling and installation.
 - 4. Owner Furnished Owner Installed (O.F.O.I.) Equipment: Provide necessary built-in backing, blocking, seismic bracing and service connections required to accommodate equipment provided by City.

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EXECUTION REQUIREMENTS

Section 01 73 10

1. GENERAL:

- A. DESCRIPTION: This Section includes administrative and procedural requirements governing the Contractor's installation of products specified for use in the Project.
- B. SUBMITTALS:
 - 1. Closeout: Refer to Section 01 77 00 - CLOSEOUT PROCEDURES.
- C. QUALITY ASSURANCE:
 - 1. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 - 2. Reference Standards: Refer to Section 01 42 00 - REFERENCES.
 - 3. Qualifications: Use installers specialized in the work required, as specified in the individual sections of the Project Manual.

2. PRODUCTS:

- A. GENERAL: Refer to Section 01 60 00 - PRODUCT REQUIREMENTS.
- B. PRODUCT HANDLING:
 - 1. Delivery: Schedule delivery of materials to the site at such time as required for proper coordination of the work. Receive materials in manufacturer's unopened packages and bearing manufacturer's label.
 - 2. Storage: Store materials in a dry and well-ventilated place, adequately protected from damage and exposure to the elements.

3. EXECUTION:

- A. PREPARATION:
 - 1. Construction Layout:
 - a. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
 - b. Verification: Before beginning to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If deviations are observed, promptly notify the City's Representative.
 - c. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
 - d. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
 - e. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by the City's Representative.
 - 2. Examination of Conditions: Carefully examine sub-surfaces before beginning work; report to the City's Representative any defects. Starting of work implies acceptance of conditions as they exist.
 - 3. Environmental Requirements: Verify that ambient temperature and moisture content are within limits of material and equipment manufacturers' instructions. Perform interior finish work only after building is closed and temperature can be maintained above 50 degrees F.
 - 4. Examination: Examine conditions of work in place before beginning work; report defects.
 - 5. Measurements:
 - a. General: Take field measurements; report discrepancies between plan and field dimensions to the City's Representative.
 - b. Templates: Obtain templates, patterns, and setting instructions as required; verify dimensions.
 - 6. Protection: Provide temporary protection and enclosures for floor and roof openings, stairways, and similar conditions. Provide adequate temporary centering, bracing, and shoring for protection of structure during construction. Protect non-ferrous metal work throughout construction period; protect materials from damage during adjacent construction activities.
- B. INSTALLATION:
 - 1. General: Install products in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Embedded Items: Coordinate delivery and placement of items embedded in work.
 - 3. Operating Equipment: Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate Work of various contractors having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

4. Mechanical and Electrical:
 - a. General: Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - b. Pipes, Ducts, Conduit, Fixtures and Outlets: In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
5. Completion:
 - a. General: Coordinate completion and clean up of Work of various subcontractors in preparation for Substantial Completion and for portions of Work designated for City's occupancy.
 - b. Correction of Defective Work: After City occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of City's activities.

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CUTTING AND PATCHING

Section 01 73 29

1. GENERAL:

- A. DESCRIPTION: Provide all cutting, fitting and patching, including excavation and backfill as required per Section 31 20 10 - EARTHWORK, to complete the Work and to accomplish the applicable listed items.
- B. LISTED ITEMS:
 - 1. Fitting: Make its several parts fit together properly.
 - 2. Untimely Work: Uncover portions of the Work to provide for installation of work not installed in the proper sequence of construction.
 - 3. Defective Work: Remove and replace defective and non-conforming work.
 - 4. Samples For Testing: Remove samples of installed work for testing per Section 01 45 23 - TESTING AND INSPECTION SERVICES and as identified in individual sections of the specifications.
 - 5. Mechanical and Electrical Penetrations: Provide penetrations of non-structural surfaces for installation of piping and conduit; refer to MECHANICAL and ELECTRICAL specifications.
 - 6. Existing Construction: Install specified work in existing Construction.
- C. SUBMITTALS:
 - 1. Cutting and/or Alteration Request:
 - a. General: Submit written request to the City's Representative in advance of executing any cutting or alteration to affected items as listed below.
 - b. Affected Items: Work process of the City or any separate contractor; structural value or integrity of any element of the Project; integrity or effectiveness of weather-exposed or moisture-resistant elements or systems; efficiency, life, maintenance or safety of operational elements; visual qualities of sight-exposed elements.
 - c. Request Requirements: Project name and location; description of all affected work; explanation of necessity for cutting, alteration or excavation; impact on the work of the City or any separate contractor, or on the structural or weatherproof integrity of the building; description of proposed work, including scope of cutting, patching, alteration, or excavation, products proposed to be used, trades who will complete the work, and extent of refinishing to be done; alternatives to cutting and patching; cost proposal, when applicable; written permission from any separate contractor whose work will be affected.
 - d. Product Substitutions: Should conditions of Work or schedule indicate change of products from original installation, submit request for substitution as specified in Section 01 25 00 - SUBSTITUTION PROCEDURES.
 - e. Field Observation: Submit written notice to the City's Representative designating date and time work will be uncovered.

2. PRODUCTS:

- A. MATERIALS: Comply with requirements of individual sections of these Specifications for replacement of Work removed and type of work to be done.

3. EXECUTION:

- A. INSPECTION:
 - 1. General: Inspect existing conditions; include elements subject to damage or movement during cutting and patching.
 - 2. After Uncovering Work: Inspect conditions affecting the installation of products, or performance of Work.
 - 3. Unsatisfactory Conditions: Report unsatisfactory or questionable conditions to the City's Representative in writing; do not proceed with work until the City's Representative has provided further instructions.
- B. PREPARATION:
 - 1. Temporary Support: Provide as necessary to assure structural value or integrity of affected portion of Work.
 - 2. Protection:
 - a. General: Provide devices and methods to protect other portions of the Project from damage.
 - b. Environmental Protection: Provide protection from elements for that portion of the Project which may be exposed by cutting and patching, and maintain excavations free from water.
- C. PERFORMANCE:
 - 1. Excavation and Backfill: Execute excavating and backfilling by methods which will prevent settlement or damage to other work per Section 31 20 10 - EARTHWORK.
 - 2. Cutting and Patching: Perform work with workers skilled in the trades involved. Make patches, seams and joints durable and inconspicuous.
 - 3. Adjustment: Execute fitting and adjustment of products to provide a finished installation

- complying with specified products, functions, tolerances and finishes.
4. Fitting: Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
 5. Restoration: Restore work which has been cut or removed; install new products to provide completed Work as shown and specified.
 6. Refinishing: Refinish entire surfaces as necessary to provide even finish to match adjacent finishes; refinish continuous surfaces to nearest intersection; entire unit of any assembly.

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CONSTRUCTION WASTE MANAGEMENT Section 01 74 19

1. GENERAL:

- A. DESCRIPTION: Provide Construction Waste Management including salvaging, recycling, and disposing of nonhazardous construction waste, as shown and specified per Contract Documents.
- B. DEFINITIONS:
1. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
 2. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
 3. Debris: Non-hazardous solid material generated during the construction, demolition, or renovation of a structure and which exceed 2.5 inch particle size, that is, a manufactured object, plant or animal matter, or natural geologic material (e.g. cobbles and boulders).
 4. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
 5. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.
 6. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
 7. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
 8. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.
- C. PERFORMANCE REQUIREMENTS:
1. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 75 percent by weight of total waste generated by the Work. City's goal is to salvage and recycle as much nonhazardous construction waste as possible including the following:
 2. Construction Waste:
 - a. Site-clearing waste.
 - b. Masonry and CMU.
 - c. Lumber.
 - d. Wood sheet materials.
 - e. Wood trim.
 - f. Metals.
 - g. Roofing.
 - h. Insulation.
 - i. Carpet and pad.
 - j. Gypsum board.
 - k. Piping.
 - l. Electrical conduit.
 - m. Materials brought onto site that must be removed from site.
 3. Packaging: Salvage or recycle 100 percent of the following uncontaminated materials:
 - a. Paper.
 - b. Cardboard.
 - c. Boxes.
 - d. Plastic sheet and film.
 - e. Polystyrene packaging.
 - f. Wood crates.
 - g. Plastic pails.
 - h. All other packaging materials.

2. PRODUCTS:

- A. SUBMITTALS:
1. General: Refer to Section 01 33 10 - SUBMITTALS and 01 33 29 - SUSTAINABLE DESIGN REPORTING.
 2. Waste Management Plan:
 - a. General: Submit 3 (three) copies of plan within 7 (seven) days of date commencement of the Work. Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis, including separate sections for demolition and construction waste. Indicate quantities by weight or volume; use same units of measure throughout waste management plan.
 - b. Waste Identification: Indicate anticipated types and quantities of construction and demolition

- waste generated by the Work. Include estimated quantities and assumptions for estimates.
- c. Waste Reduction Work Plan:
 1. General: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 2. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 3. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 5. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 6. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - d. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
 - e. Cost/Revenue Analysis:
 1. General: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 2. Total quantity of waste.
 3. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 4. Total cost of disposal (with no waste management).
 5. Revenue from salvaged materials.
 6. Revenue from recycled materials.
 7. Savings in hauling and tipping fees by donating materials.
 8. Savings in hauling and tipping fees that are avoided.
 9. Handling and transportation costs. Include cost of collection containers for each type of waste.
 10. Net additional cost or net savings from waste management plan.
 - f. Forms: Prepare waste management plan on forms included at end of Part 3.
 3. Waste Reduction Progress Reports: Submit 3 (three) copies of report, with separate reports for demolition and construction waste. Identify in submittal the material categories, generation point of the waste and total quantity of salvaged plus recycled waste recovered in tons.
 4. Waste Reduction Calculations:
 - a. General: Before request for Substantial Completion, submit 3 (three) copies of the following:
 - b. Calculated end-of-Project Rates: Identify salvage, recycling, and disposal rates as a percentage of total waste generated.
 - c. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
 - d. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
 - e. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 - f. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 - g. LEED Submittal: LEED letter template for Credit MR 2.1 and 2.2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
 - h. Qualification Data: For Waste Management Coordinator.
- B. QUALITY REQUIREMENTS:**
1. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 2. Reference Standards:
 - a. General: Refer to Section 01 42 00 - REFERENCES for reference standards, applicable codes and definitions.
 - b. American National Standards Institute (ANSI): ANSI 10.2 - Safety Code for Building Construction.
 - c. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers standard specifications.

- d. California Occupational Safety and Health Administration (CalOSHA): Construction Safety Orders; 29 CFR, PART 1926 Safety and Health Regulations for Construction.
 - e. California Integrated Waste Management Board: Sustainable Building Guidelines
 - f. U.S. Green Building Council (USGBC): LEED-NC Rating System, Version 2.2.
3. Qualifications:
- a. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
 - b. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
4. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
5. Waste Management Conference:
- a. General: Conduct conference at Project site to comply with requirements in Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to waste management including, but not limited to, the following:
 - b. Waste Management Coordinator: Review and discuss waste management plan including responsibilities.
 - c. Quantities and Disposition: Review requirements for documenting quantities of each type of waste and its disposition.
 - d. Material Separation: Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - e. Collection and Transportation: Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - f. Waste Management: Review requirements for each trade.

3. EXECUTION:

A. PERFORMANCE: Refer to Section 01 73 10 - EXECUTION REQUIREMENTS.

B. PREPARATION:

- 1. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required; refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
- 2. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management plan.
- 3. Training: Train workers, subcontractors, and suppliers on proper waste management procedures. Review Waste Management Plan procedures and identify locations established for salvage, recycling, and disposal.
- 4. Site Access and Temporary Controls: Conduct waste management operations with minimum interference with roads, streets, walks, walkways, and adjacent occupied facilities. Designate and label specific areas on the site for separating materials to be salvaged, recycled, reused, donated, and sold.

C. IMPLEMENTATION:

1. Recycling:

- a. General: Proceeds, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- b. Procedures:
 - 1. General: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 2. Containers: Provide properly marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 3. Stockpiling: Collect and process materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Store materials away from construction area, off the ground and protect from the weather; do not store within drip line of remaining trees.
 - 4. Removal: Transport recyclable waste off City's property to recycling receiver or processor.

2. Construction Waste:

a. Packaging:

- 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
- 2. Polystyrene Packaging: Separate and bag materials.
- 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. Pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

- for recycling wood.
- b. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.
- c. Wood:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- d. Gypsum Board:
 - 1. General: Stack large clean pieces on wood pallets and store in a dry location.
 - 2. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
- 3. Disposal:
 - a. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - b. Burning and Burying of Materials: NOT ALLOWED.
 - c. Disposal of Materials: Transport waste materials off City's property and legally dispose of them.

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CLOSEOUT PROCEDURES

Section 01 77 00

1. GENERAL:

- A. DESCRIPTION: Perform operations necessary for and incidental to closing out the Contract and assisting in obtaining Project acceptance by the City.
- B. FINAL CLEANING:
 - 1. General: Remove marks, stains, fingerprints, dust, dirt, and paint drippings resulting from work of this Project. Wash tile, plumbing and other fixtures clean; polish hardware and other unpainted metals. Remove temporary labels, tags and paper covering.
 - 2. Finish Surfaces: Perform specified cleaning, polishing, sealing, waxing, and other finish operations required for acceptance of work by the City.
 - 3. Glass: Employ professional window cleaners to clean glass, mirrors and plastic surfaces of putty, paint materials, stains and dirt, as specified. Leave work bright, clean and polished.
- C. CLOSEOUT SCHEDULE AND PROCEDURE:
 - 1. Requirements Preparatory to Project Acceptance:
 - a. Certifications: Deliver to the City's Representative separate written certifications as required in Section 01 33 10 - SUBMITTALS stating that no materials containing asbestos has been installed in the Work, and that materials used in construction operations and installed in the Work comply with the volatile organic compound (VOC) requirements.
 - b. Temporary Facilities: Remove from site per Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.
 - c. Cleaning: Complete thorough building and site cleaning per the Construction Contract, Article 1.2 of this Section, and the individual sections of the specifications.
 - d. Adjustments:
 - 1. General: As required in the various technical sections of this Project Manual.
 - 2. Plumbing and Mechanical Equipment: Assure that equipment operates quietly and free from vibration. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration in occupied areas of building; provide additional brackets, bracing, etc., to prevent such objectionable noise or vibration.
 - 3. Systems: Assure that all operate without humming, surging, or rapid cycling; balance reports are required before Mechanical Engineers will prepare "punch lists".
 - e. Extra Stock: Deliver one (1) percent or a minimum of one full container of each kind and type of interior or unit finish material installed, unless otherwise specified. Package materials with protective covering and identify with labels describing contents.
 - f. Affidavits: Submit affidavits of release of liens, payment of debts and claims and all applicable taxes.

2. PRODUCTS:

- A. RECORD DRAWINGS:
 - 1. General: Record drawings shall be kept up-to-date at all times. Verify that record drawings accurately show work completed to date before approval of pay requests.
 - 2. Drawings:
 - a. General: Architect will furnish required documents in reproducible medium to the Contractor.
 - b. Locations: At time of installation, record installed locations of underground, drainage, plumbing and electrical work, including storm drain grate and invert elevations on prints.
 - c. Documentation:
 - 1. General: Transfer installed locations to reproducible medium and submit documents to Architect.
 - 2. Identification of Changes: Information entered on reproducible documents shall be neat, legible and emphasized by drawing "clouds" around changed items.
 - 3. Dimensions: Locate work, including stubs for future connections, with reference to permanent landmarks or buildings and indicate depth below finish grade.
 - 4. Symbols and Designations: Use same as shown on Contract Drawings.
 - 3. As-Built Survey: As required.
 - 4. Certification: Completed Record Drawings shall be signed by Contractor as complete and accurate records of the Project, as built.
- B. OPERATION AND MAINTENANCE INSTRUCTIONS:
 - 1. General: Incorporate in Maintenance/Operating Manual(s), as specified below, brochures, manufacturer's catalogs and written instructions for equipment and materials needing regular care or maintenance; i.e., carpets, resilient flooring, architectural finishes, mechanical and electrical equipment, etc. Provide one (1) complete copy of each manual required and electronic copy (PDF) of contents.

2. Manual:
 - a. General: Prepare manuals using durable plastic loose leaf binders approximately 8-1/2 x 11 inches in size with following minimum data:
 - b. Identification: On, or readable through, a front cover stating general nature of manual.
 - c. Index: Neatly typewritten at front of manual; **clearly identify location of emergency data.**
 - d. Operation and Maintenance Data: Complete instructions for products and equipment required.
 - e. Repair/Replacement Parts: Provide name and address of nearest vendor for replacement of parts or repair services.
 - f. Additional Data: Where contents of manuals include manufacturer's catalog pages, clearly indicate precise items included in this installation and delete, or otherwise clearly indicate, manufacturer's data which is not in this installation.
 3. Operating Instructions: Mount and post instructions for equipment, as required.
 4. Service and Maintenance Contracts: As specified, executed by each subcontractor, manufacturer, and supplier as applicable.
- C. GUARANTEES:
1. General: Provide in conformance with the requirements of Construction Contract and as required in the individual sections of this Project Manual.
 2. Guarantee Period: Duration of the guarantees shall be as stated in the individual sections of this Project Manual. Guarantee periods shall commence on the official date of acceptance by the City of the Project.
 3. Submittal: Submit required Guarantees on electronic copies (PDFs) of Guarantee Form included at the end of this Section and deliver in a complete package to the City's Representative. Required Guarantee Forms must be reviewed and accepted by the City's Representative prior to final acceptance by City.

3. EXECUTION:

A. PROJECT ACCEPTANCE:

1. General: Notify City's Representative when Contractor considers the Project complete enough to prepare a punch list. The City's Representative will then notify Mechanical and Electrical Engineers to make inspections and prepare their punch lists, which must be completed before the City's Representative will conduct his inspection to determine if project is substantially complete.
2. Notification: After requirements preparatory to project acceptance have been completed, Contractor shall notify the City's Representative in writing that the Work is ready for final inspection; provide minimum three (3) days' advance notice of desired date for inspection.
3. Final Inspection: Contractor, or his agent authorized to act in his behalf, shall accompany the City's Representative on the final inspection, as well as any principal subcontractors requested by the City's Representative.

* * *

GUARANTEE FORM

Guarantee for

We hereby guarantee that the workmanship and materials that we installed in the Fire Station No. 2 (Bayside) project have been in accordance with the Drawings and Project Manual and that the work as installed will fulfill the requirements of the guarantee included in the Project Manual. We agree to repair or replace any or all work, together with any other adjacent work that we may displace in so doing, that may prove to be defective in its workmanship or material within a period of _____ (____) years from date of acceptance by the City, without any expense whatsoever to City, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of our failure to comply with the above-mentioned conditions within ten (10) days after being notified in writing by the City's Representative, we collectively or separately do hereby authorize City to proceed to have said defects repaired and made good at our expense and we will honor and pay the costs and charges therefor upon demand.

SUBCONTRACTOR:

Signed _____ Date _____

Name _____ Title _____

Company Name _____ License No. _____

Address _____

GENERAL CONTRACTOR:

Countersigned _____ Date _____

Name _____ Title _____

Company Name _____ License No. _____

Address _____

* * *

SUSTAINABLE DESIGN REQUIREMENTS Section 01 81 13

1. GENERAL:

A. SUMMARY:

1. General: Provide Sustainable Design Requirements, as shown and specified per Contract Documents.
2. Objectives:
 - a. To obtain acceptable Indoor Air Quality (IAQ) for the completed project and minimize the environmental impacts of the construction and operation, the Contractor during the construction phase of this project shall implement the following procedures singly or in combination:
 1. Select products that minimize consumption of non-renewable resources, consume reduced amounts of energy and minimize amounts of pollution to produce, and employ recycled and/or recyclable materials. To help purchasers incorporate environmental considerations into purchasing decisions, it is the intent of this project to conform with EPA's Five Guiding Principles on environmentally preferable purchasing. The five principles are:
 - a) Include environmental considerations as part of the normal purchasing process.
 - b) Emphasize pollution prevention early in the purchasing process.
 - c) Examine multiple environmental attributes throughout a product's or service's life cycle.
 - d) Compare relevant environmental impacts when selecting products and services.
 - e) Collect and base purchasing decisions on accurate and meaningful information about environmental performance.
 2. Control sources for potential IAQ pollutants by controlled selection of materials and processes used in project construction in order to attain superior IAQ.
 3. Products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and methods for performing the work of this Contract and in proposing product substitutions and/or changes to specified processes.
 3. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Divisions 02 through 49: Sustainable Design Requirements specific to the Work of each identified Section.
 - c. Waste Management: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - d. Commissioning: Refer to Section 01 91 00 - BUILDING COMMISSIONING.

B. REFERENCES:

1. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): ASHRAE/IESNA Standard 90.1
2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
3. Business and Institutional Furniture Manufacturer's Association (BIFMA): Standard X7.1.
4. Carpet and Rug Institute (CRI): Green Label Plus Indoor Air Quality Test Program.
5. Collaborative for High Performance Schools (CHPS): Requirements.
6. Efficiency Valuation Organization (EVO): The International Performance Measurement and Verification Protocol.
7. Forest Stewardship Council (FSC): Principles and Criteria.
8. Greenguard Environmental Institute (GEI): Greenguard Children and Schools.
9. Illuminating Engineering Society of North America (IESNA):
 - a. IESNA LM-9: Linear fluorescent lamps.
 - b. IESNA LM-66: Compact fluorescent lamps.
 - c. IESNA LM-51: HID lamps
10. National Institute of Standards and Technology (NIST): Building for Environmental and Economic Sustainability (BEES).
11. Rainforest Alliance (RA): Smartwood Certification Program.
12. Resilient Floor Covering Institute (RFCI): FloorScore Program.
13. Scientific Certification Systems (SCS): Standards and Certification.
14. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): IAQ Guidelines for Occupied Buildings Under Construction.
15. South Coast Air Quality Management District (SCAQMD): Rule 1113 - Architectural Coatings.
16. U.S. Environmental Protection Agency (USEPA):

- a. General: Energy Star Program.
 - b. Legislation: Energy Policy Act (EPA) of 1992 and Energy Policy Act of 2005.
 - c. Volatile Organic Compounds: EPA 40 CFR 51.100(s) - Volatile Organic Compounds (VOCs).
17. U.S. Green Building Council (USGBC):
- a. LEED NC: LEED for New Construction and Major Renovations.
 - b. LEED EB: LEED for Existing Buildings - Operations and Maintenance.
18. U.S. Federal Trade Commission (FTC): FTC Act, Part 260 - Guidelines for the Use of Environmental Marketing Claims.
- C. DEFINITIONS:
1. Agrifiber Products: Composite panel products derived from agricultural fiber.
 2. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials.
 3. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight.
 4. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that it was obtained from forests certified by a specified certification program.
 5. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder.
 6. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from, construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 7. LEED: The Leadership in Energy & Environmental Design green building rating systems developed and adopted by the U.S. Green Building Council (USGBC). The systems certify levels of environmental achievement based on a point and credit scoring system.
 8. LEED NC: The Leadership in Energy & Environmental Design green building rating system developed and adopted by the USGBC for new construction and major renovations of buildings.
 9. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky.
 10. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as or part of their feedstock.
 11. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use.
 12. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream per Section 5 of the FTC Act, Part 260 - Guidelines for the Use of Environmental Marketing Claims.
 13. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 500 miles (800 km) from the Project site.
 14. Salvaged or Reused Materials: Materials extracted from existing buildings in order to be reused in other buildings without being manufactured.
 15. Sealant: Any material that fills and seals gaps between other materials.
 16. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.
- D. SUBMITTALS:
1. General: Additional Sustainable Design submittal requirements are included in other sections of the Specifications.
 - a. Sustainable Design Submittals:
 1. Alternative Transportation: Provide manufacturer's cut sheets for bike racks installed on site, including the total number of bicycle storage slots provided. Also, provide manufacturer's cut sheets for any alternative-fuel refueling stations installed on site, including fueling capacity information for an 8-hour period.
 2. Heat Island Effect:
 - a) Site Paving: Provide manufacturer's cut sheets for impervious paving materials, highlighting the Solar Reflectance Index (SRI) of the material. Also, provide cut sheets for pervious paving materials.
 - b) Roofing Materials: Submittals for roofing materials must include manufacturer's cut sheets or product data highlighting the Solar Reflectance Index (SRI) of the material.
 3. Exterior Lighting Fixtures: Submittals must include cut sheets with manufacturer's data

on initial fixture lumens above 90° from nadir for exterior lighting fixtures, and, for parking lot lighting, verification that the fixtures are classified by the IESNA as "full cutoff" (FCO); OR provide documentation that exterior luminaires are IDA-Approved as Dark-Sky Friendly by the International Dark Sky Association (IDA) Fixture Seal of Approval Program.

4. Irrigation Systems: Provide manufacturer's cut sheets for permanent landscape irrigation system components and for any rainwater harvesting system components, such as cisterns.
5. Water Conserving Fixtures: Submittals must include manufacturer's cut sheets for water-consuming plumbing fixtures and fittings (toilets, urinals, faucets, showerheads, etc.) highlighting maximum flow rates and/or flush rates. Include cut sheets for any automatic faucet-control devices.
6. Process Water Use: Provide manufacturer's cut sheets for water-consuming commercial equipment (clothes washers, dishwashers, ice machines, etc.), highlighting water consumption performance. Include manufacturer's cut sheets or product data for any cooling towers, highlighting water consumption estimates, water use reduction measures, and corrosion inhibitors.
7. Elimination of CFCs AND HCFCs: Provide manufacturer's cut sheets for cooling equipment with manufacturer's product data, highlighting refrigerants; provide manufacturer's cut sheets for fire-suppression equipment, highlighting fire-suppression agents; provide manufacturer's cut-sheets for polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation, highlighting the blowing agent(s).
8. Appliances and Equipment: Provide copies of manufacturer's product data for Energy Star eligible equipment and appliances, including office equipment, computers and printers, electronics, and commercial food service equipment (excluding HVAC and lighting components), verifying compliance with EPA's Energy Star program.
9. On-Site Renewable Energy Systems: Provide cut sheets and manufacturer's product data for on-site renewable energy generating components and equipment, including documentation of output capacity.
10. Measurement and Verification Systems: Provide cut sheets and manufacturer's product data for controls systems, highlighting electrical metering and trending capability components.
11. Salvaged or Reused Materials: Provide documentation that lists each salvaged or reused material, the source or vendor of the material, the purchase price, and the replacement cost if greater than the purchase price.
12. Recycled Content: Submittals for materials with recycled content (excluding MEP systems equipment and components) must include the following documentation:
 - a) Cost of each material or product, excluding cost of labor and equipment for installation.
 - b) Manufacturer's product data, product literature, or a letter from the manufacturer verifying the percentage of post-consumer and pre-consumer recycled content (by weight) of each material or product.
 - c) An electronic spreadsheet that tabulates the Project's total materials cost and combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value) expressed as a percentage of total materials cost. This spreadsheet shall be submitted every third month with the Contractor's Certificate and Application for Payment. It should indicate, on an ongoing basis, line items for each material, including cost, pre-consumer recycled content, post-consumer recycled content, and combined recycled content value.
13. Regional Materials: Submittals for products or materials expected to contribute to the regional calculation (excluding MEP systems equipment and components) must include the following documentation:
 - a) Cost of each material or product, excluding cost of labor and equipment for installation.
 - b) Location of product manufacture and distance from point of manufacture to the Project Site.
 - c) Location of point of extraction, harvest, or recovery for each raw material in each product and distance from the point of extraction, harvest, or recovery to the Project Site.
 - d) Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of manufacture for each regional material.
 - e) Manufacturer's product data, product literature, or a letter from the manufacturer verifying the location and distance from the Project Site to the point of extraction, harvest, or recovery for each regional material or product, including, at a minimum,

- f) gravel and fill, planting materials, concrete, masonry, and gypsum board.
- f) An electronic spreadsheet that tabulates the Project's total materials cost and regional materials value, expressed as a percentage of total materials cost. This spreadsheet shall be submitted every third month with the Contractor's Certificate and Application for Payment. It should indicate on an ongoing basis, line items for each material, including cost, location of manufacture, distance from manufacturing plant to the Project Site, location of raw material extraction, and distance from extraction point to the Project Site.
- 14. Outdoor Air Delivery Monitoring: Provide manufacturer's cut sheets highlighting the installed carbon dioxide monitoring system components and sequence of controls shop drawing documentation, including CO₂ differential set-points and alarm capabilities.
- 15. Interior Adhesives and Sealants: Submittals for field-applied adhesives and sealants, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content.
 - a) Provide manufacturers' documentation verifying adhesives used to apply laminates, whether shop-applied or field-applied, contain no urea-formaldehyde.
- 16. Interior Paints and Coatings: Submittals for field-applied paints and coatings, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content.
- 17. Exterior Paints and Coatings: Submittals for field-applied paints and coatings, which have a potential impact on ambient air quality, must include manufacturer's MSDSs or other manufacturer's Product Data highlighting VOC content.
- 18. Floorcoverings:
 - a) Carpet Systems: Submittals for carpet must include the following:
 - 1) A copy of an assessment from the Building for Environmental and Economic Sustainability (BEES) software model, either Version 3.0 or 4.0, with parameters of the model set as described by this specification section.
 - 2) Manufacturer's product data verifying that carpet systems meet or exceed the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.
 - b) Resilient Flooring: Submittals for resilient floorcovering must include manufacturer's product data verifying certification under either the Greenguard for Children & Schools or FloorScore indoor emissions testing program.
 - c) Engineered Wood Flooring and Bamboo Flooring: Submittals for engineered wood flooring and bamboo flooring must include manufacturer's product data verifying certification under either the Greenguard or FloorScore indoor emissions testing program.
- 19. Composite Wood and Agrifiber Binders: Submittals for composite wood and agrifiber products (including but not limited to particleboard, wheatboard, strawboard, agriboard products, engineered wood components, solid-core wood doors, OSB, MDF, and plywood products) must include manufacturer's product data verifying that these products contain no urea-formaldehyde resins.
- 20. Systems Furniture and Seating: Provide manufacturer's product data verifying that systems furniture and seating products meet the requirements of one of the following:
 - a) Greenguard certification.
 - b) SCS Indoor Advantage certification.
 - c) SCS Indoor Advantage Gold certification.
 - d) BIFMA Standard X7.1-2005, as tested to BIFMA method M7.1-2005 and as verified by an independent laboratory.
 - e) Calculated indoor air concentration limits for furniture systems and seating determined by the U.S. EPA's Environmental Technology Verification Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol as conducted in an independent air quality testing laboratory.
- 21. Entryway Systems: Provide manufacturer's cut sheets for walk-off systems installed to capture particulates, including permanently installed grates, grilles, slotted systems, direct glue-down walk-off mats, and non-permanent roll-out mats.
- 22. Air Filtration: Provide manufacturer's cut sheets and product data highlighting the following:
 - a) Minimum Efficiency Reporting Value (MERV) for filtration media in air handling units (AHUs).
 - b) Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction.
- 23. Mercury in Lighting: Provide manufacturer's cut sheets or product data for fluorescent or HID lamps highlighting mercury content.

24. Lighting Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting lighting controls systems components.
 25. Thermal Comfort Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting thermal comfort-control systems components.
 26. Blended Cement: It is the intent of this specification to reduce CO₂ emissions and other environmentally detrimental effects resulting from the production of portland cement by requiring that concrete mixes, in aggregate, utilize blended cement mixes to displace 40% of the portland cement typically included in conventional construction. Provide the following submittals:
 - a) Copies of concrete design mixes for installed concrete.
 - b) Copies of typical regional baseline concrete design mixes for compressive strengths used on the Project.
 - c) Quantities in cubic yards of each installed concrete mix.
 27. Gypsum Board: Provide manufacturer's cut sheets or product data verifying that gypsum board products are moisture and mold-resistant.
 28. Fiberglass Insulation: Provide manufacturer's cut sheets or product data verifying that fiberglass batt insulation contains no urea-formaldehyde.
 29. Duct Acoustical Insulation: Provide manufacturer's cut sheets or product data verifying that mechanical sound insulation materials in air distribution ducts consist of impervious, non-porous coatings that prevent dust from accumulating in the insulating materials.
 30. Green Housekeeping: Provide documentation that cleaning products and janitorial paper products meet the VOC limits and content requirements of this specification section.
- b. Project Materials Cost Data: Provide a spreadsheet in an electronic file indicating the total cost for the Project and the total cost of building materials used for the Project, as follows:
1. Not more than 60 days after the Preconstruction Meeting, the General Contractor shall provide to the City's Representative a preliminary schedule of materials costs for materials used for the Project organized by specification section. Exclude labor costs and mechanical, electrical, and plumbing (MEP) systems materials and labor costs. Include the following:
 - a) Identify each reused or salvaged material, its cost, and its replacement value.
 - b) Identify each recycled-content material, its post-consumer and pre-consumer recycled content as a percentage the product's weight, its cost, its combined recycled content value (defined as the sum of the post-consumer recycled content value plus one-half of the pre-consumer recycled content value), and the total combined recycled content value for materials as a percentage of total materials costs.
 - c) Identify each regional material, its cost, its manufacturing location, the distance of this location from the Project site, the source location for each raw material component of the material, the distance of these extraction locations from the Project site, and the total value of regional materials as a percentage of total materials costs.
 - d) Identify each biobased material, its source, its cost, and the total value of biobased materials as a percentage of total materials costs. Also provide the total value of rapidly renewable materials (materials made from plants that are harvested in less than a 10-year cycle) as a percentage of total materials costs.
 - e) Identify each wood-based material, its cost, the total wood-based materials cost, each FSC Certified wood material, its cost, and the total value of FSC Certified wood as a percentage of total wood-based materials costs.
 - f) Provide submittals and cost data for all required materials that will be necessary for LEED credit documentation.
 - g) Provide final versions of the above spreadsheets to the City's Representative not more than 14 days after Substantial Completion.
 2. Construction Waste Management: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT for submittal requirements.
 3. Construction Indoor Air Quality (IAQ) Management: Submittals must include the following:
 - a) Not more than 30 days after the Preconstruction Meeting, prepare and submit for the City's Representative's approval, an electronic copy of the draft Construction IAQ Management Plan in an electronic file including, but not limited to, descriptions of the following:
 - 1) Construction procedures for meeting or exceeding the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, Chapter 3, including procedures for HVAC Protection, Source Control, Pathway Interruption, Housekeeping, and Scheduling.
 - 2) Construction procedures for protecting absorptive materials stored on site.

- installed from moisture damage.
 - 3) Schedule of submission to the City's Representative of photographs of on-site construction IAQ management measures such as protection of ducts and on-site stored oil and installed absorptive materials.
 - 4) Construction procedures if air handlers must be used during construction, including a description of filtration media to be used at each return air grille.
 - 5) Construction procedure for replacing air-filtration media immediately prior to occupancy after completion of construction, including a description of filtration media to be used at each air handling or air supply unit.
 - b) Not more than 30 days following receipt of the approved draft CIAQMP, submit an electronic copy of the approved CIAQMP in an electronic file, along with the following:
 - 1) Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media to be installed at return air grilles during construction if permanently installed AHUs are used during construction.
 - 2) Manufacturer's cut sheets and product data highlighting the Minimum Efficiency Reporting Value (MERV) for filtration media in air handling units (AHUs).
 - c) Not more than 14 days after Substantial Completion provide the following:
 - 1) Documentation verifying required replacement of air filtration media in air handling units (AHUs) after the completion of construction and prior to occupancy and, if applicable, required installation of filtration during construction.
 - 2) A minimum of 18 Construction photographs: Six photographs taken on three different occasions during construction of the SMACNA approaches employed, along with a brief description of each approach, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 - 4. Commissioning: See Section 01 91 00 - BUILDING COMMISSIONING for submittal requirements.
 - 5. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports for the following:
 - a) LEED Progress Reports: Refer to Section 01 33 29 - SUSTAINABLE DESIGN REPORTING.
 - b) Construction Waste Management: Waste reduction progress reports and logs complying with the requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - c) Construction IAQ Management: See details below under Section 3.B Construction Indoor Air Quality Management for Construction IAQ management progress report requirements.
- E. QUALITY ASSURANCE:**
- 1. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with the City's Representative, and Subcontractors to discuss the Construction Waste Management Plan, the required Construction Indoor Air Quality (IAQ) Management Plan, and other Sustainable Design Requirements. The purpose of this meeting is to develop a mutual understanding of the Project's Sustainable Design Requirements and coordination of the Contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.
 - 2. Construction Job Conferences: The status of compliance with the Sustainable Design Requirements of these specifications will be an agenda item at regular job meetings conducted during the course of work at the site and included in the minutes of those meetings and referring to the table in 2.A.15.a.7.

2. PRODUCTS:

A. PRODUCT ENVIRONMENTAL REQUIREMENTS:

- 1. Site Clearing: Topsoil shall be provided by the Contractor from on-site material which has been stockpiled for reuse. Off-site borrow should only be used when on-site sources are exhausted. Chip and/or compost on site vegetated material identified for removal.
- 2. Do not burn rubbish, organic matter, etc. or any material on the site. Dispose of waste per Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
- 3. Site Paving: Site impervious paving must be light colored, with a Solar Reflectance Index (SRI) per ASTM E1980 of at least 29.
- 4. Roofing Materials: Roofing systems, other than vegetated roof systems, must comply with the following requirements:
 - a. Low-Sloped roofing less than or equal to 2:12 slope must have an SRI of at least 78.
 - b. Steep-Sloped roofing greater than 2:12 slope must have an SRI of at least 29.

5. Exterior Lighting Fixtures:
 - a. Exterior luminaires must emit 0% of the total initial designed fixture lumens at an angle above 90° from nadir and/or meet the requirements of the Dark Sky certification program.
 - b. Exterior lighting cannot exceed 80% of the lighting power densities defined by ASHRAE/IESNA Standard 90.1, Exterior Lighting Section, without amendments.
 - c. No lighting of building facades or landscape features is permitted.
6. Herbicides and Pest Control: Herbicides shall not be permitted, and pest control measures shall utilize EPA-registered biopesticides only.
7. Irrigation Systems: Any permanent landscape irrigation systems must be supplied entirely by collected rainwater or graywater and must be comprised of below-grade drip emitters controlled by moisture sensors. Timer controls shall not be permitted.
8. Water-Conserving Fixtures: Plumbing fixtures and fittings shall use in aggregate at least 40% less water than the water use baseline calculated for the building after meeting the Energy Policy Act of 1992 fixture performance requirements. Flow and flush rates shall not exceed the following:
 - a. Toilets: No more than 1.3 gallons per flush, otherwise be dual flush 1.6/0.8 gallons per flush, and have documented bowl evacuation capability per MaP testing of at least 400 grams.
 - b. Urinals: No more than 0.125 gallons per flush or use.
 - c. Lavatory Faucets: 0.5 gpm with automatic faucet controls.
 - d. Kitchen Sink Lavatories: 2.2 gpm.
 - e. Showerheads: No more than 1.5 gpm.
9. Process Water Use: Employ strategies that in aggregate result in 20% less water use than the process water use baseline for the building after meeting the commercial equipment and HVAC performance requirements as listed in the Table below. For equipment not addressed by Energy Policy Act of 2005 or the list below, additional equipment performance requirements may be proposed provided documentation supporting the proposed benchmark or industry standard is submitted.
 - a. Clothes Washer: 7.5 gallons/cubic foot/cycle.
 - b. Dishwasher with Racks: 1.0 gallons/rack.
 - c. Ice Machine: 20 gallons/100 pounds of ice for machines making over 175 pounds of ice per day; 30 gallons/100 pounds ice for machines making less than 175 ice per day. Avoid water-cooled machines.
 - d. Food Steamer: 2 gallons/hour. Use only boilerless steamers.
 - e. Pre-Rinse Spray Valves: 1.4 gallons/minute.
 - f. Kitchen Pot-Washing Sinks: 2.2 gallons/minute.
 - g. Cooling Towers: 2.3 gallons/ton-hr. water loss.
 1. Use atrazine-based corrosion inhibitors and reducing bleed-off by increasing cycles of concentration (at least 5, or with water quality problems limit to 4).
 2. Install meters on make-up water and discharge blow-down.
 3. Install conductivity controller for blow-down.
 4. Provide overflow alarm connected to central building controls.
 5. Install drift eliminators.
 6. Provide makeup water from sources other than potable water supply.
10. Elimination of CFCs AND HCFCs:
 - a. Ozone Protection: Base building cooling equipment shall contain no refrigerants other than the following: HCFC-123, HFC-134a, HFC-245fa, HFC-407c, or HFC 410a.
 - b. Fire suppression systems may not contain ozone-depleting substances.
 - c. Extruded polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation shall not be manufactured with hydrochlorofluorocarbon (HCFC) blowing agents.
11. Appliances and Equipment: Energy Star eligible equipment and appliances, including office equipment, computers and printers, electronics, and commercial food service equipment (excluding HVAC and lighting components), shall be qualified by EPA's Energy Star Program.
12. HVAC Distribution Efficiency:
 - a. Duct systems shall be constructed of galvanized sheet metal, aluminum, or stainless steel as deemed appropriate based on the application requirements. No fiberglass duct board shall be permitted.
 - b. Medium- and high-pressure ductwork systems shall be pressure-tested in accordance with the current SMACNA standards.
 - c. All ductwork shall be externally insulated. No interior duct liner shall be permitted.
 - d. Where possible, air terminal connections shall be hard-connected with sheet metal ductwork. If flexible ductwork is used, no flexible duct extension shall be more than six feet in length.
 - e. HVAC equipment shall be isolated from the ductwork system with flexible duct connectors to minimize the transmittance of vibration.
 - f. Supply and return air branch ducts shall include the appropriate style of volume damper. Air terminal devices such as grilles, registers, and diffusers shall be balanced at duct branch

13. Measurement and Verification: Install controls and monitoring devices as required by division 22 - PLUMBING, 23 - HEATING, VENTILATING AND AIR CONDITIONING and 26 - ELECTRICAL in order to comply with International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003, Option D.
14. Salvaged or Reused Materials: There shall be no substitutions for specified salvaged and reused materials and products.
15. Recycled Content of Materials:
 - a. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 30% of the cost of materials used for the Project, exclusive of MEP equipment, labor, and delivery costs. The Contractor shall make attempts to maximize the procurement of materials with recycled content.
 1. The post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
 2. The pre-consumer recycled content value of a material shall be determined by dividing the weight of pre-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
 3. Do not include mechanical and electrical components in the calculations.
 4. Do not include labor and delivery costs in the calculations.
 5. Recycled content of materials shall be defined according to the Federal Trade Commission's "FTC Act, Part 260 - Guidelines for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).
 6. Utilize on-site existing paving materials that are scheduled for demolition as granulated fill, and include the cost of this material had it been purchased in the calculations for recycled content value.
 7. At a minimum, the materials in the following list must contain the minimum recycled content indicated:

CATEGORY	MINIMUM RECYCLED CONTENT
Compost/mulch	100% post-consumer
Asphaltic Concrete Paving	25% post-consumer
Cast-in-Place Concrete	6% pre-consumer
CMU: Gray Block	20% pre-consumer
Steel Reinforcing Bars	90% combined
Structural Steel Shapes	90% combined
Steel Joists	75% combined
Steel Deck	75% combined
Steel Fabrications	60% combined
Steel Studs	30% combined
Steel Roofing	30% post-consumer
Aluminum Fabrications	35% combined
Rigid Insulation	20% pre-consumer
Batt insulation	30% combined
Cellulose Insulation	90% combined
Rock Wool Insulation	75% pre-consumer
Fireproofing	20% combined
Steel Doors and Frames	35% combined
Gypsum Board	100% combined

Carpet	40% combined
Ceramic Tile Flooring	60% combined
Rubber Flooring and Base	60% combined
Acoustical Ceiling Tile (ACT)	40% post-consumer
ACT Suspension System	90% post-consumer
Toilet Partitions	60% post-consumer

16. Regional Materials: Provide a minimum of 20 percent of building materials (by cost) that are manufactured and extracted/harvested within a 500-mile radius of the project site, exclusive of labor and delivery costs. The Contractor shall make attempts to maximize the procurement of materials within this specified 500-mile radius.
17. Biobased Products:
- a. Use only biobased concrete form-release products.
 - b. Solid Wood Products: New solid-wood-based materials will be certified as "FSC 100%" by an independent third party in accordance with Forest Stewardship Council (FSC) "Principles and Criteria" and will have received Chain-of-Custody Certification as certified by an accredited certification group such as Rainforest Alliance (RA) (Smartwood) or Scientific Certification Systems (SCS).
 - c. Other Wood Products: Other new wood-based materials will be certified by an independent third party in accordance with any of the following standards:
 - 1. Forest Stewardship Council (FSC) "Principles and Criteria" and has received Chain-of-Custody Certification as certified by an accredited certification group such as Rainforest Alliance (RA) (Smartwood) or Scientific Certification Systems (SCS).
 - d. Preservative-treated lumber with chromated copper arsenate (CCA) treatments is not permitted, and lumber with copper-based treatments (such as ACQ) is permitted only for ground-contact applications.
 - e. Wood-based materials include but are not limited to the following materials (when made from wood), engineered wood products, or wood-based panel products:

1. Rough carpentry.	11. Wood paneling.
2. Miscellaneous carpentry.	12. Wood veneer wall covering.
3. Heavy timber construction.	13. Wood flooring.
4. Wood decking.	14. Wood lockers.
5. Particleboard.	15. Wood cabinets.
6. Plywood.	16. Wood doors.
7. Metal-plate-connected wood trusses.	17. Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection.
8. Structural glued-laminated timber.	
9. Finish carpentry.	
10. Architectural woodwork.	
18. Brominated Flame Retardants: For new furniture, do not utilize cushioned office seating, and for lounge seating, do not utilize cushioned seating with brominated flame retardants.
19. Outdoor Air Delivery Monitoring:
- a. Spaces with an occupant density greater than 1 person per 40 square feet must include at least one CO₂ monitor located between 3 feet and 6 feet above the finished floor.
 - b. Spaces with occupant density less than 1 person per 40 square feet must include a direct outdoor airflow monitor, capable of measuring the minimum outdoor airflow rate within 15% accuracy.
 - c. Monitoring equipment must be configured to generate a building automation system alarm and a visual or audible alert when CO₂ concentrations vary by 10% or more from set point.
20. Adhesives and Sealants:
- a. Adhesives and sealants used inside the building's thermal envelope must be third-party certified under one of the following programs:
 - 1. Indoor Advantage Plus from Scientific Certification Systems (SCS).
 - 2. Greenguard Environmental Institute (GEI) Greenguard Children and Schools.
 - 3. Collaborative for High Performance Schools (CHPS).
 - b. Adhesives and sealants, regardless of where they are used, must comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):
 - 1. Concrete Curing Compound: 60 g/L.
 - 2. Concrete Sealer: 10 g/L.

3. Concrete Form Release Agents: 0g/L.
 4. Garage Deck Sealer: 50g/L.
 5. Wood Glues: 20 g/L.
 6. Millwork and Casework Adhesives: 20g/L.
 7. Metal to Metal Adhesives: 30 g/L.
 8. Adhesives for Porous Materials (Except Wood): 50 g/L.
 9. Subfloor Adhesives: 50 g/L.
 10. Plastic Foam Adhesives: 50 g/L.
 11. Carpet Adhesives: 50 g/L.
 12. Carpet Pad Adhesives: 50 g/L.
 13. Carpet Seam Sealer: 50g/L.
 14. VCT and Sheet Vinyl Adhesives: 50 g/L.
 15. Cove Base Adhesives: 50 g/L.
 16. Rubber Floor Adhesives: 60 g/L.
 17. Wood Flooring Adhesives: 100 g/L.
 18. Ceramic Tile Adhesives: 65 g/L.
 19. Gypsum Board and Panel Adhesives: 50 g/L.
 20. Gypsum Drywall Joint Compound: 20 g/L.
 21. Portland Cement Plaster: 20 g/L.
 22. Multipurpose Construction Adhesives: 70 g/L.
 23. Cast Resin Countertop Silicone Sealant: 20g/L.
 24. Plastic Laminate Adhesives: 20 g/L.
 25. General Contact Adhesive: 80 g/L.
 26. Structural Glazing Adhesives and Compounds: 100 g/L.
 27. Silicone Sealant: 50 g/L.
 28. Pipe Thread Sealant: 50 g/L.
 29. Duct Sealant: 10 g/L.
 30. Plastic Cement Welding Compounds: 250 g/L.
 31. ABS Welding Compounds: 400 g/L.
 32. CPVC Welding Compounds: 270 g/L.
 33. PVC Welding Compounds: 150 g/L.
 34. Adhesive Primer for Plastic: 250 g/L.
 35. Architectural Sealants: 250 g/L.
 36. Single-Ply Roofing Membrane Adhesives: 250 g/L.
 - c. Interior sealants shall not contain: mercury, butyl rubber, neoprene, SBR (styrene butadi-ene rubber), or nitrile.
 - d. Sealants and glazing compounds formulated with aromatic solvents (organic solvent with a benzene ring in its molecular structure) fibrous talc or asbestos, formaldehyde, halo-genated solvents, mercury, lead, cadmium, hexavalent chromium, or their components shall not be used.
 - e. Adhesives used to apply laminates, whether shop-applied or field-applied, shall contain no urea-formaldehyde.
21. Paints and Coatings:
- a. Interior Paints and Coatings: For interior field-applied applications, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the chemical restrictions (Restricted Components listed below) of Green Seal Standard GS-11, Paints; Green Seal Standard GC-03, Anti-Corrosive Paints; and South Coast Air Quality Management District Rule 1113, Architectural Coatings, rules in effect on January 1, 2004, as follows:
 1. Flat Paints and Coatings: Not more than 10 grams of VOC per liter of coating less water and exempt compounds, including pigments.
 2. Non-Flat Paints and Coatings Except High Gloss: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments.
 3. High Gloss Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments. High Gloss Coatings are coatings that register a gloss of 70 or above on a 60-degree meter according to ASTM D523 as specified in paragraph (e)(6).
 4. Water-Based Polychromatic Finish Coatings: Not more than 150 g/L (150 g/L for primer and flat polychromatic paint).
 5. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds.
 6. Sanding Sealers: Not more than 50 grams of VOC per liter of coating less water and exempt compounds.
 7. Waterproofing Sealers: Not more than 100 grams of VOC per liter of coating less water and exempt compounds.
 8. Concrete Slab Sealers: Not more than 10 grams of VOC per liter of coating less water

- and exempt compounds.
 - 9. Polyurethanes: Not more than 100 grams of VOC per liter of coating less water and exempt compounds.
 - 10. Stains: Not more than 250 grams of VOC per liter of coating less water and exempt compounds.
 - b. Interior field applied varnishes and lacquers are not permitted.
 - c. Interior paints shall not contain antimicrobial additives (such as fungicides and biocides).
 - d. Exterior Paints and Coatings: For exterior applications, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the chemical restrictions (Restricted Components listed below) of Green Seal Standard GS-11:
 - 1. Flat Paints and Coatings: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments.
 - 2. Non-Flat Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments.
 - 3. High Gloss Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments. High Gloss Coatings are coatings that register a gloss of 70 or above on a 60-degree meter according to ASTM D523 as specified in paragraph (e)(6).
 - 4. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds.
 - 5. Varnishes and Sanding Sealers: Not more than 275 grams of VOC per liter of coating less water and exempt compounds.
 - 6. Stains: Not more than 250 grams of VOC per liter of coating less water and exempt compounds.
 - e. Aromatic Compounds: Paints and coatings shall not contain more than 1% (by weight) total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - f. Restricted Components: Paints and coatings shall not contain the following:
 - 1. Acrolein.
 - 2. Acrylonitrile.
 - 3. Aniline dyes.
 - 4. Antimony.
 - 5. Benzene.
 - 6. Butyl benzyl phthalate.
 - 7. Cadmium.
 - 8. Di (2-ethylhexyl) phthalate.
 - 9. Di-n-butyl phthalate.
 - 10. Di-n-octyl phthalate.
 - 11. 1,2-dichlorobenzene.
 - 12. Diethyl phthalate.
 - 13. Dimethyl phthalate.
 - 14. Ethylbenzene.
 - 15. Formaldehyde.
 - 16. Hexavalent chromium.
 - 17. Isophorone.
 - 18. Lead.
 - 19. Mercury.
 - 20. Methyl ethyl ketone.
 - 21. Methyl isobutyl ketone.
 - 22. Methylene chloride.
 - 23. Naphthalene.
 - 24. Toluene (methylbenzene).
 - 25. 1,1,1-trichloroethane.
 - 26. Vinyl chloride.
 - 27. Xylene.
 - g. Coordinate with paint manufacturers for implementing a "take-back program" for unused paint. Set aside scrap and unused paint to be returned to the manufacturer for recycling into new product. Close and seal partially used containers of paint to maintain quality as necessary for reuse.
22. Floorcoverings:
- a. Carpet shall achieve an Environmental Performance Score of 0.0200 as determined through an assessment in the NIST Building for Environmental and Economic Sustainability (BEES) software model, either Version 3.0 or 4.0. The parameters of the model must be set in the following way for this assessment:
 - 1. "Environmental vs. Economics Performance Weights" shall be set at 100% Environmental Performance.
 - 2. "Environmental Impact Category Weights" shall be set using the EPA Scientific Advisory Board weights.
 - 3. "Transportation from "Manufacture to Use" shall be set at the lowest distance possible.
 - 4. In the "Nylon Carpet Parameters" dialogue box, set "Carpet Type" as "Carpet Tile" and "Installation Glue" as "Low VOC Glue."
 - b. Carpet systems, including adhesives, must meet or exceed the Carpet and Rug Institute (CRI) Green Label Plus Indoor Air Quality Test Program.
 - c. Carpet cushion shall not contain brominated flame retardants.
 - d. Carpet tile applications shall be self-adhering.
 - e. Resilient floorcovering must be certified under the Greenguard Environmental Institute (GEI) or RFCI FloorScore indoor emissions testing programs.

- Environmental Institute (GEI) or RFCI FloorScore indoor emissions testing programs.
23. Composite Wood and Agrifiber Binders: Composite wood, agrifiber products, and wood doors shall contain no added urea-formaldehyde resins.
 24. Systems Furniture and Seating:
 - a. Systems furniture and seating shall meet the requirements of one of the following:
 1. Greenguard Environmental Institute (GEI) certification.
 2. Scientific Certification Systems (SCS) Indoor Advantage certification
 3. Scientific Certification Systems (SCS) Indoor Advantage Gold certification.
 4. Business and Institutional Furniture Manufacturer's Association (BIFMA) Standard X7.1, as tested to BIFMA method M7.1 and as verified by an independent laboratory.
 5. Calculated indoor air concentration limits for furniture systems and seating determined by the U.S. EPA's Environmental Technology Verification Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes testing protocol as conducted in an independent air quality testing laboratory.
 - b. Systems furniture and seating made with coatings or sealants that contain any of the following solvents are not permitted: naphtha, benzene, toluene, xylene, hexavalent chromium.
 25. Entryway Systems: Walk-off systems to capture particulates shall be installed at least 12 feet long in the direction of entry travel at entryways directly connected to the outdoors that are used as regular entry points by building users. Acceptable entryway systems include:
 - a. Permanently installed grates, grilles, or slotted systems that allow for cleaning beneath them.
 - b. Permanently installed direct glue-down walk-off mats.
 - c. Non-permanent roll-out mats, but only if a service organization is contracted for maintenance on a weekly basis.
 26. Air Filtration: Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in air handling units for processing both return and outside air that is delivered to the air supply system. Replace filtration media after the completion of construction and prior to occupancy.
 27. Mercury in Lighting:
 - a. Provide only low-mercury fluorescent or HID lamps with mercury content limited to the following:
 1. T-5 and T-8 fluorescent lamps: 80 picograms per lumen hour.
 - b. Measurement Standards: Lumens to be measured according to IES LM9 for linear fluorescent lamps, IES LM66 for compact fluorescent lamps, and LM51 for HID lamps; mercury content to be measured according to U.S. EPA "Total Mercury by Cold Vapor Absorption Method" 7471A.
 28. Lighting Controls: Install and calibrate controls as specified by Division 26 - ELECTRICAL in order to comply with LEED IAQ lighting controllability requirements.
 29. Thermal Comfort: Install and calibrate controls as specified in Section 23 - HEATING, VENTILATING AND AIR CONDITIONING.
 30. Blended Cement Concrete:
 - a. Cementitious Materials: Provide composite mix of portland cement and ground granulated blast-furnace slag or fly ash or blended hydraulic cement and limit percentage (by weight) of portland cement (ASTM C150) in aggregate (total weighted average of cementitious material weight for mixes and pours) to 40% less than standard regional concrete mix designs.
 - b. Limit percentage (by weight) of standard portland cement, to the following maximum percentages of the cementitious portion of the mix while maintaining the above-40% required reduction in portland cement across the Project's total quantity of concrete:
 1. Footings: 50%.
 2. Slab on Grade: 60%, except for cold-weather pours.
 3. Insulated Concrete Form Concrete: 40%.
 4. Elevated Slabs: 60%, except for cold-weather pours.
 5. Exterior Concrete: 75%.
 31. Gypsum Board: Standard paper-faced gypsum board can be used only in dry climates, where wetting during or after construction is not anticipated. In humid climates, where dampness and condensation are a concern, use only non-paper-faced gypsum board. In wet locations a cementitious board, made of portland or magnesium oxide cement, must be used.
 32. Fiberglass Insulation: Fiberglass batt insulation shall contain no formaldehyde-based binders or shall be third-party certified for conformance with Greenguard Children & Schools or Indoor Advantage Gold.
 33. Duct Acoustical Insulation: Mechanical sound insulation materials within the duct shall consist of an impervious, non-porous coating that prevents dust from accumulating in the insulating materials.

34. Green Housekeeping:
 - a. Utilize cleaning products that meet the requirements of the Green Seal GS-37 standard or comply with the requirements and maximum VOC limits of Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Article 2, Regulation for Reducing VOC Emissions from Consumer Products.
 - b. Utilize janitorial paper products and trash bags that meet the minimum percentages of post-consumer recycled content and recovered content requirements of EPA's Comprehensive Procurement Guidelines.

3. EXECUTION:

A. CONSTRUCTION WASTE MANAGEMENT:

1. Develop and implement a Construction Waste Management Plan (CWMP), as defined in Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT quantifying material diversion by weight in order to recycle, reuse, and/or salvage at least 95% (by weight) of construction, demolition, and land-clearing waste.
2. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
3. Utilize any on-site existing paving materials that are scheduled for demolition as granulated fill or subbase material, and include the weight of this material in the calculations for material diverted from landfill disposal.
4. Arrange for materials collection by or materials delivery to the appropriate recycling or reuse facility.
5. Tax credits and other savings obtained or revenue generated for recycled or reused materials accrue to the Contractor.
6. Discuss CWMP procedures and measures as an agenda item at regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.
7. Submit monthly progress reports with Applications for Payment in accordance with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT, documenting the status of the CWMP and current diversion percentage rates.

B. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT:

1. Develop and implement a Construction IAQ Management Plan (CIAQMP) to prevent indoor air quality problems resulting from construction activities, including, at minimum, the following:
 - a. Construction activities must meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction.
 - b. During construction, protect absorptive materials stored on-site or installed from moisture damage as described in the Construction IAQ Management Plan (CIAQMP) defined above. Specifically:
 1. Exercise special care at all times in the storage of materials to prevent exposure to moisture.
 2. Avoid installation of gypsum board and other porous materials until the building is weather-tight.
 3. Standing water which accumulates on interior floors shall be removed on the day that it is observed.
 4. Any drywall that has retained more than 20% moisture after 48 hours following exposure to moisture, or that has evidence of mold, must be disposed of in accordance with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 5. The contractor shall identify and remove porous building materials that become wet or damaged by moisture within 7 calendar days of such exposure.
 - c. During construction and HVAC system installation, provide the City's Representative with photographs of IAQ management measures (such as protection of ducts and on-site or installed absorptive materials), including six photographs on three different occasions depicting implemented SMACNA approaches.
2. Air Filtration:
 - a. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in air handling units for processing both return and outside air that is delivered to the air supply system; replace filtration media after the completion of construction and prior to occupancy.
 - b. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 8 or better for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction. Inspect weekly and replace as required.
3. Discuss CIAQMP procedures and measures as an agenda item at regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.

C. COMMISSIONING: Building energy-related systems and building envelope components shall be commissioned in accordance with the requirements of Section 01 91 00 - BUILDING COMMISSIONING and related commissioning sections in other divisions in order to verify and ensure

that fundamental building elements and systems are installed, constructed, calibrated to operate, and perform according to the City's Project Requirements, Basis of Design, and Construction Documents.

D. MEASUREMENT & VERIFICATION:

1. For new construction, comply with the requirements of the Efficiency Valuation Organization (EVO) International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, Option B or D.
2. For existing buildings, comply with the requirements of the Efficiency Valuation Organization (EVO) International Performance Measurement & Verification Protocol (IPMVP), Volume I: Concepts and Options for Determining Energy and Water Savings, Option B or D.

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ATTACHMENT: LEED 2009 for New Construction and Major Renovations - Project Scorecard



LEED 2009 for New Construction and Major Renovation

Project Scorecard - Final CD Revised 1/10/12

Bayside Fire Station No. 2

22			2	2	Sustainable Sites		Possible Points: 26
Y	N	?					
Y			Prereq 1	Construction Activity Pollution Prevention			
1			Credit 1	Site Selection			1
5			Credit 2	Development Density and Community Connectivity			5
1			Credit 3	Brownfield Redevelopment			1
6			Credit 4.1	Alternative Transportation—Public Transportation Access			6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms			1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles			3
		2	Credit 4.4	Alternative Transportation—Parking Capacity			2
1			Credit 5.1	Site Development—Protect or Restore Habitat			1
1			Credit 5.2	Site Development—Maximize Open Space			1
1			Credit 6.1	Stormwater Design—Quantity Control			1
1			Credit 6.2	Stormwater Design—Quality Control			1
	1		Credit 7.1	Heat Island Effect—Non-roof			1
1			Credit 7.2	Heat Island Effect—Roof			1
	1		Credit 8	Light Pollution Reduction			1

4			5	1	Water Efficiency		Possible Points: 10
Y			Prereq 1	Water Use Reduction—20% Reduction			
2	2		Credit 1	Water Efficient Landscaping			2 to 4
		2		Reduce by 50%			2
				No Potable Water Use or Irrigation			4
	2		Credit 2	Innovative Wastewater Technologies			2
2	1	1	Credit 3	Water Use Reduction			2 to 4
		2		Reduce by 30%			2
		3		Reduce by 35%			3
				Reduce by 40%			4

Y	N	?
30	5	0

Energy and Atmosphere

Possible Points: 35

Y		
Y		
Y		
17	2	

- Prereq 1 Fundamental Commissioning of Building Energy Systems
- Prereq 2 Minimum Energy Performance
- Prereq 3 Fundamental Refrigerant Management

Credit 1 Optimize Energy Performance 1 to 19

	Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
	Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
	Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
	Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
	Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
	Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
	Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
	Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
	Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
	Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
	Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
	Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
	Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
	Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
	Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
	Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
17	Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
	Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
	Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19

7		
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Credit 2 On-Site Renewable Energy 1 to 7

	1% Renewable Energy	1
	3% Renewable Energy	2
	5% Renewable Energy	3
	7% Renewable Energy	4
	9% Renewable Energy	5
	11% Renewable Energy	6
7	13% Renewable Energy	7

2		
2		
	3	
2		

- Credit 3 Enhanced Commissioning 2
- Credit 4 Enhanced Refrigerant Management 2
- Credit 5 Measurement and Verification 3
- Credit 6 Green Power 2

Y	N	?
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5	7	2	Materials and Resources	Possible Points: 14
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Y		Prereq 1	Storage and Collection of Recyclables	
	3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
			Reuse 55%	1
			Reuse 75%	2
			Reuse 95%	3
	1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
1		Credit 2	Construction Waste Management	1 to 2
			1 50% Recycled or Salvaged	1
			1 75% Recycled or Salvaged	2
	2	Credit 3	Materials Reuse	1 to 2
			Reuse 5%	1
			Reuse 10%	2
2		Credit 4	Recycled Content	1 to 2
			1 10% of Content	1
			1 20% of Content	2
1		Credit 5	Regional Materials	1 to 2
			1 10% of Materials	1
			? 20% of Materials	2
	1	Credit 6	Rapidly Renewable Materials	1
1		Credit 7	Certified Wood	1

13	0	2	Indoor Environmental Quality	Possible Points: 15
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Y		Prereq 1	Minimum Indoor Air Quality Performance		
Y		Prereq 2	Environmental Tobacco Smoke (ETS) Control		
1		Credit 1	Outdoor Air Delivery Monitoring	1	
1		Credit 2	Increased Ventilation	1	
1		Credit 3.1	Construction IAQ Management Plan—During Construction	1	
1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1	
1		Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1	
1		Credit 4.2	Low-Emitting Materials—Paints and Coatings	1	
1		Credit 4.3	Low-Emitting Materials—Flooring Systems	1	
1		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1	
1		Credit 5	Indoor Chemical and Pollutant Source Control	1	
1		Credit 6.1	Controllability of Systems—Lighting	1	
1		Credit 6.2	Controllability of Systems—Thermal Comfort	1	
1		Credit 7.1	Thermal Comfort—Design	1	
1		Credit 7.2	Thermal Comfort—Verification	1	
		1	Credit 8.1	Daylight and Views—Daylight	1
		1	Credit 8.2	Daylight and Views—Views	1

Y	N	?
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4	0	2	Innovation and Design Process	Possible Points: 6
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1			Credit 1.1	Innovation in Design: Materials with recycled content to 30%	1
		1	Credit 1.2	Innovation in Design: Exceeding 75% Construction Waste (95%)	1
		1	Credit 1.3	Innovation in Design: Green cleaning contract	1
1			Credit 1.4	Innovation in Design: Public education	1
1			Credit 1.5	Innovation in Design: Green Power	1
1			Credit 2	LEED Accredited Professional	1

2	1	1	Regional Priority Credits	Possible Points: 4
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1			Credit 1.1	Regional Priority: SSc5.2 - Site Development, Maximize Open Space	1
	1		Credit 1.2	Regional Priority: WEc2 - Innovative Wastewater Technologies	X
	N		Credit 1.3	Regional Priority: WEc3 - Water Use Reduction 40%	1
1			Credit 1.4	Regional Priority: EAc2 - On-Site Renewable Energy 1%	1
	N		Credit 1.5	Regional Priority: MRc1.1 - Building Reuse—Maintain Existing Walls, Floors, and Roof 55%	X
		1	Credit 1.6	Regional Priority: IEQc8.1 - Daylight and Views—Daylight	1

80	20	10	Total	Possible Points: 110
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Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

BUILDING COMMISSIONING

Section 01 91 00

1. GENERAL:

A. SUMMARY:

1. Section Includes:
 - a. Commissioning description.
 - b. Submittals.
 - c. Commissioning services.
 - d. Commissioning responsibilities.
 - e. Commissioning meetings.
 - f. Commissioning reports.
 - g. Test equipment.
 - h. Verification check and startup procedures.
 - i. Functional performance test procedures.
 - j. Function performance test methods.
 - k. Deficiencies and test approvals.
 - l. Demonstration.
2. Related Sections:
 - a. Section 22 08 00 - COMMISSIONING OF PLUMBING EQUIPMENT: Plumbing systems commissioning requirements.
 - b. Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS: Mechanical systems commissioning requirements.
 - c. Section 26 08 00 - COMMISSIONING OF ELECTRICAL EQUIPMENT: Electrical systems commissioning requirements.
 - d. General requirements per Division 01.

B. REFERENCES:

1. Associated Air Balance Council: AABC - AABC Commissioning Guideline.
2. American Society of Heating, Refrigerating and Air-Conditioning Engineers: ASHRAE Guideline 1.1-2007 - The HVAC Commissioning Process.

C. COMMISSIONING DESCRIPTION:

1. Commissioning: Systematic process of ensuring systems perform interactively according to design intent and City's operational needs. Commissioning process encompasses and coordinates system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training, and verification of actual performance.
2. Commissioning Intent:
 - a. Verify equipment and systems are installed in accordance with manufacturer's instructions, industry accepted minimum standards, and Contract Documents.
 - b. Verify equipment and systems receive adequate operational checkout by Contractors.
 - c. Verify and document proper performance of equipment and systems.
 - d. Verify complete operation and maintenance documentation is delivered to City.
 - e. Verify City's operating personnel are adequately trained.
3. Equipment and Systems to Be Commissioned: Refer to Section 22 08 00 - COMMISSIONING OF PLUMBING EQUIPMENT, 23 08 00 - COMMISSIONING OF HVAC SYSTEMS, and 26 08 00 - COMMISSIONING OF ELECTRICAL EQUIPMENT for equipment and system lists.
4. Commissioning does not relieve Contractor of responsibility to provide finished and fully functioning Project.
5. Commissioning Process Overview and General Order of Commissioning Tasks:
 - a. Commissioning begins with initial commissioning meeting.
 - b. Conduct progress commissioning meetings throughout construction, to plan, scope, coordinate, schedule future activities and resolve problems.
 - c. Equipment documentation is submitted to Commissioning Authority during normal submittals, with detailed start-up procedures.
 - d. Commissioning Authority works with Contractor and equipment and system installers to develop startup plans and startup documentation formats, including verification checklists to be completed by installers, during verification check and startup process.
 - e. In general, checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with verification checklists being completed before functional testing.
 - f. Equipment and system installers execute and document verification checklists and perform verification check and startup. Commissioning Authority documents checklists and startup were completed according to approved plans.
 - g. Commissioning Authority develops specific equipment and system functional performance test procedures. [Contractor and] equipment and system installers review procedures.
 - h. Equipment and system installers execute procedures under direction of, and documented by

- i. Commissioning Authority.
 - i. Items of non-compliance in material, installation or setup are corrected at Contractor's expense and system retested.
 - j. Commissioning Authority reviews operation and maintenance documentation for completeness.
 - k. Commissioning is completed before Substantial Completion.
 - l. Commissioning Authority reviews, approves and coordinates training provided by equipment and system installers and verifies training was completed.
 - m. Deferred testing is conducted, as specified.
- D. SUBMITTALS:
- 1. Section 01 33 10 - SUBMITTALS: Requirements for submittals.
- E. COMMISSIONING SUBMITTALS:
- 1. Furnish (2) two half sized copies of Contract Documents including specifications, change orders, requests for interpretation, meeting minutes, and other related items to the Commissioning Authority.
 - 2. Furnish one copy of submittals directly to Commissioning Authority for review and approval in accordance with procedures specified in Section 01 33 10 - SUBMITTALS.
 - a. Make submittals for each piece of equipment or system indicated to be commissioned.
 - b. Make submittals to Commissioning Authority concurrent with submittals to Architect/Engineer.
 - c. Distribute one copy of approved submittals to Commissioning Authority.
 - 3. Furnish one copy of preliminary operation and maintenance data manuals to Commissioning Authority for each piece of equipment or system indicated to be commissioned.
 - a. Submit required manuals within 30 days after submittals for each piece of equipment and system required and under Section 01 33 10 - SUBMITTALS.
 - 4. Make additional submittals requested by Commissioning Authority for each piece of equipment or system indicated to be commissioned. Incorporate requested submittal information into related operation and maintenance manuals. Include the following:
 - a. Manufacturer's printed detailed installation and start-up, operating, troubleshooting and maintenance procedures.
 - b. Equipment performance curves.
 - c. Factory test reports.
 - d. Full sequence of operation and control diagrams.
 - e. Proposed testing, adjusting, and balancing procedures.
 - f. Complete warranty information, with City responsibilities to keep warranty in force identified.
 - g. Lists of installation and checkout materials shipped with equipment.
 - h. Manufacturer's field checkout forms to be used by factory or field technicians.
 - i. Other documentation necessary for commissioning process.
 - 5. Submit written training plan to Commissioning Authority for review and approval prior to conducting training including the following:
 - a. Equipment included in training session.
 - b. Intended audience.
 - c. Location of training.
 - d. Objectives.
 - e. Subjects covered.
 - f. Duration of training on each subject.
 - g. Instructor for each subject.
 - h. Instructional methods to be used.
 - 6. Commissioning Authority will review and approve submittals for conformance to Contract Documents as related to commissioning process for primary purpose of aiding development of functional testing procedures and secondarily to verify compliance with equipment specifications.
- F. CLOSEOUT SUBMITTALS:
- 1. Section 01 77 00 - CLOSEOUT PROCEDURES.
 - 2. Operation and Maintenance Data: Submit operation and maintenance manuals as specified in individual equipment and system specifications.
 - a. Submittals made to Commissioning Authority do not constitute compliance with operation and maintenance manual documentation.
 - 3. Commissioning Record: Commissioning Authority will submit one copy of commissioning record for inclusion in operation and maintenance manuals. Furnish records in following format, arranged by system, with each part separated by tabbed dividers:
 - a. Commissioning Plan.
 - b. Final Commissioning Report.
 - c. Provide the following separated by tabbed dividers:
 - 1. Design narrative and criteria, sequences, approvals.
 - 2. Startup plan and report, approvals, corrections, and blank verification checklists.
 - d. Separate data for each equipment type with colored separators.

3. Completed, functional tests, trending and analysis, approvals and corrections, training plan, record and approvals, blank functional test forms, and recommended recommissioning schedule.
 4. Final Commissioning Report: Commissioning Authority will submit one copy of final commissioning report including the following:
 - a. Executive summary with list and roles of participants, brief Project description, overview of commissioning and testing scope, and general description of testing and verification methods.
 - b. For Each Piece of Commissioned Equipment: Include statement regarding compliance with Contract Documents in the following areas:
 1. Equipment specifications.
 2. Equipment installation.
 3. Functional performance and efficiency.
 4. Equipment documentation and design intent.
 5. Operator training.
 - c. Include recommendations for improvement to equipment or operations, future actions, and commissioning process changes.
 - d. List outstanding deficiencies referenced to specific functional test, inspection, trend log, or other record where deficiency is documented.
 - e. Include brief description of verification method used, observations and conclusions from testing for each commissioned piece of equipment and system.
- G. QUALITY ASSURANCE:
1. Perform Work in accordance with AABC Commissioning Group (ACG) Guidelines and ASHRAE Guideline 0-2005 and 1.1-2007.
- H. COMMISSIONING SERVICES:
1. City will employ and pay for specified services of an independent firm as Commissioning Authority.
- I. COMMISSIONING RESPONSIBILITIES:
1. Responsibilities indicated for City, Architect/Engineer, and Commissioning Authority are provided only to clarify commissioning process. All parties are required to follow the Project specific Commissioning Plan produced by the Commissioning Authority.
 2. Architect/Engineer of Record Responsibilities:
 - a. Perform site observation of each system just before system startup.
 - b. Furnish design narratives and sequences documentation requested by Commissioning Authority.
 - c. Clarify operation and control of commissioned equipment when specifications, control drawings, or equipment documentation are not sufficient for writing detailed testing procedures.
 - d. Coordinate resolution of design issues affecting system performance identified during commissioning.
 - e. Coordinate resolution of system deficiencies identified during commissioning, according to Contract Documents.
 - f. Prepare and submit final design intent documentation, reflecting installed conditions, for inclusion in operation and maintenance manuals.
 - g. Perform normal Contractor submittal reviews as contracted.
 - h. Attend commissioning scope and team meeting as required.
 - i. Review and approve operation and maintenance manuals.
 - j. Make presentation at one training session for City's personnel.
 - k. Review verification checklists for major pieces of equipment.
 - l. Review functional test procedure forms for major pieces of equipment.
 - m. Witness tests for equipment and systems as requested by the Commissioning Authority.
 3. Commissioning Authority Responsibilities:
 - a. Basic Responsibilities:
 1. Coordinate, direct, and approve commissioning work.
 2. Develop and coordinate execution of commissioning plan. Revise commissioning plan to suit Project conditions.
 3. Schedule commissioning work with Contractor for inclusion in Project schedule.
 4. Plan and conduct commissioning meetings.
 5. Request and review commissioning submittals required to perform commissioning tasks.
 6. Write and distribute verification tests and checklists.
 7. Develop verification check and startup plan in cooperation with Contractor and equipment and system installers.
 8. Write functional performance test procedures in cooperation with Contractor and equipment and system installers.
 9. Review test and balance execution plan.

- Resolve potential conflicts with commissioning activities.
11. Observe equipment and system installations.
 12. Document equipment and systems are installed and perform in accordance with design intent and Contract Documents.
 13. Notify City, Architect/Engineer and Contractor(s) of any deficiencies.
 14. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
 15. Oversee and approve content and adequacy of City's personnel training.
 16. Review and approve operation and maintenance manuals.
 17. Compile commissioning record and testing data manual.
 18. Provide final commissioning report.
 19. Return to site minimum (8) eight months after Substantial Completion and before the expiration of correction / warranty period.
 - a) Review current equipment and system operation and condition of outstanding issues related to original and seasonal commissioning with City's personnel.
 - b) Interview City's personnel to identify problems or concerns regarding equipment and system operation.
 - c) Make suggestions for improvements and for recording changes in operation and maintenance manuals.
 - d) Identify deficiencies covered by warranty or original construction contract.
 - b. Commissioning Authority may not:
 1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Approve or accept any portion of the Work.
 3. Assume duties of Contractor or Architect/Engineer.
 4. Stop the Work.
4. City Responsibilities:
- a. Arrange for City's personnel to attend commissioning activities and training sessions according to commissioning plan.
 - b. Approve commissioning work completion.
 - c. Ensure seasonal or deferred testing and deficiency issues are addressed.
5. Contractor Responsibilities:
- a. Include requirements for commissioning submittal data, operation and maintenance data, commissioning tasks and training in each purchase order and subcontract for equipment and systems indicated to be commissioned.
 - b. Facilitate coordination of commissioning work by Commissioning Authority.
 - c. Attend commissioning meetings.
 - d. Cooperate with Commissioning Authority, and provide access to the Work and to manufacturers' facilities.
 - e. Require equipment and system installers to execute test to review and provide comments on functional test procedures.
 - f. Require manufacturers to review commissioning test procedures for equipment installed by manufacturer.
 - g. Furnish proprietary test equipment required by manufacturers to complete equipment and system tests, include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents.
 - h. Provide temporary facilities as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS for Commissioning Authority's exclusive use for documentation and instrument storage and preparation of reports.
 - i. Furnish qualified personnel to assist in completing commissioning.
 - j. Furnish manufacturer's qualified field representatives as specified in Section 01 43 00 - QUALITY ASSURANCE and individual specification sections to assist in completing commissioning.
 - k. Ensure equipment and system installers execute commissioning responsibilities according to Contract Documents and schedule.
 - l. Coordinate City's personnel training.
 - m. Prepare operation and maintenance manuals specified in Section 01 77 00 - CLOSEOUT PROCEDURES, 22 08 00 - COMMISSIONING OF PLUMBING EQUIPMENT, 23 08 00 - COMMISSIONING OF HVAC SYSTEMS, and 26 08 00 - COMMISSIONING OF ELECTRICAL EQUIPMENT. Update original sequences of operation reflecting actual installation.
 - n. Ensure equipment and system installers execute seasonal and deferred functional performance testing, witnessed by Commissioning Authority.
 - o. Ensure equipment and system installers correct deficiencies and make necessary adjustments to operation and maintenance manuals and Record Documents for issues identified in seasonal testing.

- J. COMMISSIONING MEETINGS:
1. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION.
 2. Commissioning Authority will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
 3. Initial Commissioning Meeting:
 - a. Commissioning Authority will schedule meeting within 30 days after Notice to Proceed by the City.
 - b. Attendance Required: Commissioning Authority, City, City's facility operating personnel, Architect/Engineer, Contractor, subcontractors, test, adjust and balance agency. Require attendance by installers of the following equipment and systems indicated to be commissioned including:
 1. Mechanical equipment and systems.
 2. Plumbing equipment and systems.
 3. Electrical equipment and systems.
 4. Temperature controls equipment and systems.
 - c. Agenda:
 1. Designation of personnel representing parties for commissioning activities.
 2. Review commissioning process and responsibilities.
 3. Review commissioning plan development procedures.
 4. Discuss required commissioning submittals.
 5. Discuss initial commissioning schedule.
 6. Designate the lines of communication for required items (submittals and request for interpretation) and discussions.
 4. Progress Commissioning Meetings:
 - a. Commissioning Authority will schedule meetings throughout progress of the Work at maximum monthly intervals.
 - b. Attendance Required: As specified for initial commissioning meeting.
 - c. Agenda:
 1. Review the Project completion level.
 2. Coordination of commissioning activities.
 3. Commissioning deficiency resolution.
 4. Commissioning schedule.
 5. Planning for future commissioning activities.
 5. Commissioning Authority will record meeting minutes and distribute copies within (7) seven days after meeting to participants and those affected by decisions made.
- K. COMMISSIONING REPORTS:
1. Commissioning Authority Reports: Submit Project Observation Reports regularly to City, Architect/Engineer, and Contractor. Include the following.
 - a. Progress reports.
 - b. Scheduling changes.
 - c. Observation reports of specific commissioning activities.
 - d. Testing progress and approvals.
 - e. Deficiency and deficiency resolution reports.
 2. Commissioning Authority Functional Performance Test Procedures: Develop test procedures including forms with following information. Include completed documentation in operation and maintenance manuals.
 - a. System and equipment or component names.
 - b. Equipment location and identification number.
 - c. Unique test identification number, and reference to unique verification checklist and startup documentation identification numbers for piece of equipment.
 - d. Date.
 - e. Project name.
 - f. Participating parties.
 - g. Copy of specification section describing test requirements.
 - h. Copy of specific sequence of operations or other specified parameters being verified.
 - i. Formulas used in calculations.
 - j. Required pre-test field measurements.
 - k. Instructions for setting up test.
 - l. Special cautions, alarm limits, and safety concerns.
 - m. Specific step-by-step procedures to execute test, in clear, sequential and repeatable format.
 - n. Acceptance criteria of proper performance with Yes / No check box to allow for marking whether or not proper performance of each part of test was achieved.
 - o. Section for comments.
 - p. Signatures and date block for Commissioning Authority.

L. SEQUENCING:

1. Sequence work to complete commissioning, except for functional testing and City's personnel training, before Substantial Completion.
2. Sequence work to achieve Functional Completion before Final Completion. Complete the following for each piece of equipment and system indicated to be commissioned to achieve Functional Completion:
 - a. Complete and sign startup and verification checklist documentation.
 - b. Submit trend log data.
 - c. Submit final approved test and balance report.
 - d. Complete functional testing.
 - e. Complete training of City personnel.
 - f. Submit approved operation and maintenance data manuals.
 - g. Correct identified deficiencies or obtain approval by City to exclude deficiencies from Functional Completion.
3. For equipment or systems requiring seasonal operation, perform commissioning for other season within eight months of Substantial Completion.
4. For equipment or systems where commissioning is delayed by City occupancy requirements or other unforeseen conditions, perform commissioning as specified for seasonal operation equipment.

M. SCHEDULING:

1. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION and 01 32 14 - PROGRESS SCHEDULE for scheduling.
2. Schedule work to allow adequate time for commissioning activities.
3. Identify commissioning milestones, activities, and durations on Project schedule.
 - a. Identify the following for each piece of equipment and system including:
 1. Operation and maintenance manual submittal.
 2. Verification check and startup.
 3. Functional performance test.
 4. Functional completion.
 5. Demonstration and training sessions.
 6. Commissioning completion.

N. MAINTENANCE MATERIALS:

1. Section 01 77 00 - CLOSEOUT PROCEDURES.
2. Furnish one set of manufacturer's proprietary test equipment, tools, and instruments required to complete commissioning.
 - a. Deliver test equipment to City after completion of functional performance test. Obtain signed receipt.

2. PRODUCTS:

A. TEST EQUIPMENT:

1. Testing Equipment: Calibrated within last year; of sufficient quality and accuracy to test and measure system performance within the following tolerances unless otherwise specified for individual equipment or systems.
 - a. Temperature Sensors and Digital Thermometers: 0.5 degrees F (0.25 degrees C) accuracy and plus or minus 0.1 degrees F (0.05 degrees C) resolution.
 - b. Pressure Sensors: Accuracy of plus or minus 2.0 percent of measured value range.
2. Recalibrate test equipment according to manufacturer's recommended intervals and when dropped or damaged.
 - a. Affix calibration tags to test equipment or furnish certificates upon request.
3. Equipment Furnished by Contractor and Remaining Property of Contractor:
 - a. Standard testing equipment required to perform verification check and startup and required functional performance testing.
 - b. Two way radios for personnel performing commissioning.

3. EXECUTION:

A. EXAMINATION:

1. Verify equipment and systems are installed in accordance with individual specification sections.
2. Verify utility and power connections are complete and services operational.

B. VERIFICATION CHECK AND STARTUP PROCEDURES:

1. Notify Commissioning Authority and schedule verification check and startup activities with each party required to complete verification check and startup minimum 3 weeks in advance.
2. Allow Commissioning Authority to witness verification check and startup.
 - a. Primary Equipment: Commissioning Authority will witness procedures for each piece of equipment. For multiple units, Commissioning Authority will witness procedures on 20 percent, but not less than 4, of each type unit.

- b. Secondary Equipment: Commissioning Authority will witness sampling of each type unit as specified in Commissioning Plan. Sampling will be 20 percent of units, but not less than 4, of each type unit.
- 3. Verification Check and Startup:
 - a. Perform verification check and startup in accordance with approved verification check and startup plan.
 - b. Complete entire plan for each piece of equipment or system indicated to be commissioned.
 - c. Complete each procedure in sequence performed by party assigned to each procedure.
 - d. Record completion of each procedure. Indicate results of procedure where required. Sign and date plan by individual performing procedure.
 - e. Identify items not completed successfully.
 - f. Sign and date plan indicating completion of entire plan.
 - g. Submit executed plan to Commissioning Authority within 2 days of completion.
- 4. Deficiencies and Approvals:
 - a. Commissioning Authority will review verification check and startup reports and issue deficiency report or approval.
 - b. Correct deficiencies and resubmit updated verification check and startup report with statement indicating corrections made for Commissioning Authority approval.
 - c. Repeat process until verification check and startup report is approved.
 - d. Costs for incomplete verification check and startup items that later cause deficiencies or delays during functional tests may be charged to party responsible for incomplete item.
- C. FUNCTIONAL PERFORMANCE TEST PROCEDURES:
 - 1. Complete the following before performing functional tests:
 - a. Verification check and startup.
 - b. Control system testing with approval by Commissioning Authority for use for test and balance operations.
 - c. Air system balancing and water system balancing.
 - 2. Notify Commissioning Authority of completion of verification check and startup activities.
 - 3. Commissioning Authority will direct, witness, and document results of functional performance tests.
 - 4. Conduct functional performance tests as specified in Sections 22 08 00 - COMMISSIONING OF PLUMBING EQUIPMENT, 23 08 00 - COMMISSIONING OF HVAC SYSTEMS, and 26 08 00 - COMMISSIONING OF ELECTRICAL EQUIPMENT.
 - 5. Demonstrate each piece of equipment and system is operating according to documented design intent and Contract Documents.
 - a. Conduct testing proceeding from components to subsystems, to systems.
 - b. Bring equipment and systems to condition capable full dynamic operation.
 - c. Verify performance of individual components and systems.
 - d. Verify performance of interactions between systems.
 - e. Identify and correct areas of deficient performance.
 - 6. Operate each piece of equipment and system through each specified mode of operation including seasonal, occupied, unoccupied, warm up, cool down, partial load and full load conditions.
 - a. Verify each sequence in sequences of operation.
 - b. Test for proper responses to power failure, freezing, overheating, low oil pressure, no flow, equipment failure, and other abnormal conditions.
- D. FUNCTIONAL PERFORMANCE TEST METHODS:
 - 1. Perform testing and verification by using manual testing or by monitoring performance and analyzing results using control system trend log capabilities or by stand-alone data loggers as specified for each piece of equipment or system.
 - a. Commissioning Authority may require alternate or additional method, other than specified method.
 - b. Commissioning Authority will determine test method when method is not specified.
 - 2. Simulated Conditions: Simulating conditions, not by overwritten values, is permitted. Timing tests to use real conditions is encouraged wherever practical.
 - 3. Overwritten Values: Overwriting sensor values to simulate conditions may be used with caution and avoided when possible.
 - 4. Simulated Signals: Using signal generator to create simulated signals to test and calibrate transducers automatic temperature controls is generally recommended over using sensors as signal generators with simulated conditions or overwritten values.
 - 5. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test specific sequence is acceptable. Reset setpoint after completing test.
 - 6. Indirect Indicators: Using indirect indicators for responses or performance is permitted only after visually and directly verifying and documenting indirect readings through control system representing actual conditions and responses over tested parameter range.

7. Perform each function and test under conditions simulating actual conditions as close as is practically possible.
 - a. Provide materials, system modifications, and other things necessary to produce flows, pressures, temperatures, and other responses to execute test according to specified conditions.
 - b. At completion of test, return modified equipment and systems to pretest condition.
8. Sampling: Multiple identical pieces of equipment or system with only small size or capacity differences may be functionally tested using sampling strategy when permitted by other section according to following rule.
 - a. Do not use sampling strategy for equipment with significant differences in application or sequence of operation differences.
 - b. Refer to Section 23 08 00 for equipment sampling and failure rates.

20 percent Sampling - 20 percent Failure Rule

20 = percent of group of identical equipment included in each sample.

20 = percent of sample failing, that will require another sample to be tested.
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Randomly test at least 20 percent, and minimum 4, of each group of identical equipment. (first sample) When 20 percent of units in first sample fail, test another 20 percent of group. (second sample) When 20 percent of units in second sample fail, test remaining units in group.
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- c. When frequent failures occur, Commissioning Authority may stop testing and require responsible party to perform and document checkout of remaining units, prior to continuing with functional performance testing.

E. DEFICIENCIES AND TEST APPROVALS:

1. Deficiencies:
 - a. Commissioning Authority will record and report deficiencies to City.
 - b. Minor deficiencies may be corrected during tests at Commissioning Authority's discretion. Deficiency and resolution will be documented on procedure form.
 - c. Failure to attend scheduled verification check, startup, or functional performance test will be considered deficiency.
 - d. When deficiency is identified, Commissioning Authority will discuss issue with party executing test.
 1. When party executing test accepts responsibility to correct deficiency:
 - a) Commissioning Authority documents deficiency and executing party's response.
 - b) Commissioning Authority submits deficiency report to City, Contractor, and party executing test.
 - c) Party executing test corrects deficiency; signs statement of correction certifying equipment is ready retesting and submits form to Commissioning Authority.
 - d) Commissioning Authority reschedules test and test is repeated until satisfactory performance is achieved.
 2. When party executing test disputes deficiency or responsibility for deficiency:
 - a) Commissioning Authority documents deficiency and executing party's response.
 - b) Commissioning Authority submits deficiency report to City, Contractor, and party executing test and party believed to be responsible for deficiency.
 - c) City negotiates resolution with parties involved and refers continuing disputes to Architect/Engineer for resolution in accordance with Contract Documents.
 - d) Commissioning Authority documents resolution process.
 - e) When resolution is decided, appropriate party corrects deficiency; signs statement of correction certifying equipment is ready for retesting and submits form to Commissioning Authority.
 - f) Commissioning Authority reschedules test and test is repeated until satisfactory performance is achieved.
2. Retesting Costs:
 - a. When verification check and startup or functional performance test deficiency is discovered requiring rescheduling or retesting:
 1. City will compensate Commissioning Authority for attending and directing additional testing.
 2. City will deduct additional testing compensation from final payment due to Contractor.
3. Provide written report to Commissioning Authority before each scheduled commissioning meeting concerning status of each deficiency. Include explanations of disagreements with resolution proposals for each discrepancy.
 - a. Commissioning Authority will retain original deficiency forms until end of Project.

4. Manufacturing Defects: When 10 percent, but not less than 3 identical pieces of equipment fail to perform to Contract Document requirements due to manufacturing defect, all identical units may be considered defective by City.
 - a. Within one week of notice from City, examine all other identical units and record findings. Submit findings to City within two weeks of original notice.
 - b. Within two weeks of original notification, provide signed and dated, written explanation of problem, cause of defect, and proposed solutions meeting Contract Document requirements. Include equipment submittals supporting solution.
 - c. City will determine whether replacement or repair of all identical units is required.
 - d. Install two examples of proposed solution. City will test installations for up to one week, before deciding solution is acceptable.
 - e. Upon acceptance, replace or repair all identical items, at Contractor's expense. Extend warranty accordingly, when original equipment warranty had begun.
 - f. Complete repairs or replacements with reasonable speed beginning within one week from when parts can be obtained.
 5. Test Approval: Commissioning Authority notes each satisfactorily demonstrated function on functional performance test form.
 - a. Commissioning Authority recommends acceptance of each test to City using standard form.
 - b. City gives final approval for each test using same form, providing signed copy to Commissioning Authority and Contractor.
- F. DEMONSTRATION:
1. Demonstrate equipment and systems and train City's personnel as specified in individual equipment and system specifications.
 - a. Commissioning Authority will interview City's personnel to determine special needs and areas where training will be most valuable.
 - b. City and Commissioning Authority will determine type and extent of training for each commissioned piece of equipment and system.
 - c. Commissioning Authority will communicate training requirements to Contractor for benefit of equipment and system installers and manufacturers with training responsibilities.
 2. Commissioning Authority will develop criteria for determining training was satisfactorily completed, including attending some training sessions.
 - a. Commissioning Authority will make recommendation to City regarding approval of training.
 3. Initial Mechanical Equipment Training Session:
 - a. Engineer of Record will provide one hour long presentation of overall system design concept and design concept of each equipment section.
 - b. Presentation will include review of the following systems using simplified system schematics:
 1. Split type and variable refrigerant flow air conditioning systems
 2. Indoor air quality
 3. Parking ventilation system adopting CO monitoring system
 4. Mechanical ventilation system
 5. Domestic hot water system
 6. Emergency power distribution system
 7. Lighting control system
 8. PV System
 9. Building Automation System to monitor/control above systems
 4. For primary mechanical equipment training:
 - a. Require controls contractor to provide short discussion of equipment control as part of training session.
 5. At one training session, Commissioning Authority will make one hour long presentation discussing use of blank functional test forms for re-commissioning equipment.
 6. Contractor will video tape training sessions, catalog tapes, and furnish (2) two sets of tapes for inclusion with operation and maintenance manuals.
 7. Minimum of 36 hours of training after the entire systems have been completed and commissioned and another 24 hours of training after eight (8) months.

* End Division 01 *

Division 02 - EXISTING CONDITIONS

DEMOLITION

Section 02 41 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Demolition, as shown and specified per Contract Documents.
2. Retained Items: Carefully remove items to remain property of Owner and be reinstalled in the work.

B. REFERENCES:

1. American National Standards Institute (ANSI): ANSI 10.2 - Safety Code for Building Construction.
2. American Society of Safety Engineers (ASSE): ANSI/ASSE A10.6 - Safety Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations.
3. California Occupational Safety and Health Administration (CalOSHA): Title 8 - Construction Safety Orders.
4. Concrete Sawing and Drilling Association (CSDA): Standards and Specifications.
5. National Fire Protection Association (NFPA): NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.
6. Occupational Safety and Health Administration (OSHA): Standards.

C. SUBMITTALS:

1. Schedule of Demolition Activities: Submit a detailed sequence of demolition and removal work, including dates for shutoff, capping, and continuance of utility services.
2. Procedures: Submit written procedures documenting the proposed methods to be used to control dust and noise.
3. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
4. Pre-demolition Photographs and Video: Submit photographs and video before Work begins that show existing conditions of adjoining construction, including finish surfaces that might be misconstrued as damage caused by demolition operations; refer to Section 01 32 33 - PHOTOGRAPHIC DOCUMENTATION.
5. Landfill Records: Submit receipt indicating acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

2. PRODUCTS:

Not Used

3. EXECUTION:

A. PREPARATION:

1. General: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
2. Scheduling:
 - a. General: Coordinate and schedule demolition work as required by the Owner and as necessary to facilitate construction progress.
 - b. Existing Utilities: Coordinate disconnection and capping of existing gas, water, sewer, electrical, telephone, cable and security system utilities; verify work is complete before starting demolition work affecting these utilities.
3. Examination:
 - a. General: Examine conditions of work in place before beginning work; report existence of hazardous materials or unsafe structural conditions; refer to Section.
 - b. Existing Conditions Survey: Record existing conditions by use of measured drawings, preconstruction photographs or video; refer to Section 01 32 33 - PHOTOGRAPHIC DOCUMENTATION.
 - c. Hazardous Materials: Refer to Section 01 35 43.13 - ENVIRONMENTAL PROCEDURES FOR HAZARDOUS WASTE and Section 02 50 00 - SITE REMEDIATION.
4. Measurements: Take field measurements; report variance between plan and field dimensions.
5. Protection:
 - a. General: Refer to Division 01 - GENERAL REQUIREMENTS.
 - b. Site: Protect existing adjacent installations not scheduled for demolition from damage; take measures to prevent damage to adjacent structures, trees, streets, curbs, walks, etc.

- sewers, etc., during demolition and construction.
 - c. Safety Precautions: Prevent damage to existing elements identified to remain or to be salvaged, and prevent injury to the public and workmen engaged on site. Demolish building elements in such manner that demolished materials fall within foundation lines of building. Do not allow demolition debris to accumulate on site. Pull down hazardous work at end of each day; do not leave standing or hanging overnight, or over weekends.
 - d. Dust: Contain and control dust produced by operations as required by jurisdictional agencies.
- B. DEMOLITION:
- 1. General: Perform demolition as shown and remove from the site. Use methods required to complete Work within limitations of governing regulations.
 - 2. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 3. Explosives: Use not permitted.
 - 4. Utilities: Disconnect, remove, cap and identify designated utilities within demolition areas.
 - 5. Disposal:
 - a. General: Demolished materials become property of the Contractor and shall be removed from premises, except those items specifically listed to be retained by Owner.
 - b. Burning and Burying of Materials: NOT ALLOWED.
 - c. Haul Routes:
 - 1. General: Obtain permits as required by jurisdictional agencies. Establish haul routes in advance; post flagmen for the safety of the public and workmen.
 - 2. Maintenance: Keep streets free of mud, rubbish, etc.; assume responsibility for damage resulting from hauling operations; hold Owner free of liability in connection therewith.

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SITE REMEDIATION

Section 02 50 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Site Remediation, as shown and specified per Contract Documents.
2. Description of Work:
 - a. General: The work covered by this section includes work tasks during and after the performance of remediation activities.
 - b. Coordination with Other Work: Coordinate remediation activities. Coordination procedures shall be explained in the Contractor's Accident Prevention Plan and shall describe how the Contractor will prevent lead exposure to other Contractors and/or other personnel performing work unrelated to remediation activities.
3. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Supplemental Special Conditions:
 1. General: Refer to the Supplemental Special Provisions, "Greenbook" and "White Book".
 2. Section 703: Encountering or Releasing Hazardous Substances.
 3. Section 705: Water Discharges.
 - c. Environmental Procedures: Refer to Section 01 35 43.13 - SAFETY AND ENVIRONMENTAL PROCEDURES FOR HAZARDOUS WASTE.
 - d. Management and Disposal of Waste: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - e. Demolition: Refer to Section 02 41 00 - DEMOLITION.
 - f. Earthwork: Refer to Section 31 20 10 - EARTHWORK.
 - g. Dewatering: Refer to Section 31 23 19 - DEWATERING.

B. REFERENCES:

1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced standard specifications.
2. State of California, Department of Industrial Relations (Cal/OSHA):
 - a. Title 8 - California Code of Regulations (CCR): Division 1, Chapter 4, Subchapter 4: Construction Safety Orders.
 - b. Title 22 - California Code of Regulations (CCR), Division 4.5: Chapter 10: Hazardous Waste Management.
3. U. S. Environmental Protection Agency (EPA):
 - a. General: Laws and regulations.
 - b. 29 CFR 1910.1001: Asbestos - General Industry.
 - c. 29 CFR 1910.1101: Asbestos - Construction Industry.
 - d. 29 CFR 1926: Safety and Health Regulations for Construction.
 - e. 40 CFR 61: Subpart A and Subpart M, USEPA, National Emission Standards for Hazardous Air Pollutants (NESHAP).
 - f. 40 CFR 61.145: Standard for Demolition and Renovation.
 - g. 40 CFR 273: Standards for Universal Waste Management.
 - h. 40 CFR Part 763, Appendix D to Subpart E: Transport and Disposal of Asbestos Waste.
 - i. 40 CFR 745, Section 65: Lead-based Paint Hazards.
 - j. 40 CFR 745, Section 223: Definitions (Lead-based Paint Hazards).

C. ADMINISTRATIVE REQUIREMENTS:

1. Licenses, Permits and Notifications: The Contractor shall certify in writing to the local environmental protection agency responsible for remediation activities is notified at least 10 days prior to the commencement of work that all licenses, permits and notifications have been obtained. The Contractor is responsible for all associated fees or costs incurred in obtaining the licenses, permits and notifications.
2. Training: Training to meet remediation requirements shall be provided by an EPA accredited training provider and the Contractor shall provide proof in the Qualifications and Organization Report showing that personnel have passed certification examinations for their respective disciplines, that fees for certification have been paid to the EPA (or to the state for state-run programs) and that EPA has certified the supervisor, risk assessor, workers to perform their duties.
3. Sampling and Analysis: As required by federal and state requirements.

D. SUBMITTALS:

1. Product Data:
 - a. Materials, Equipment, and Expendable Supplies: A description of the materials, equipment and expendable supplies required; including Material Safety Data Sheets (MSDS) for material brought onsite to perform the work.

- b. Qualifications: A report providing evidence of qualifications and designating responsibilities for personnel and laboratories.
- 2. Test Reports:
 - a. Licenses, Permits, and Notifications: Certification that licenses, permits, and notifications have been obtained as required.
 - b. Sampling and Analysis: A log of the analytical results from sampling conducted during the remediation. The log of results shall be kept current with project activities and shall be briefed to the Contracting Officer as analytical results are reported.
 - c. Abatement Report: Report written by the certified supervisor covering each element of the remediation.
- E. QUALITY ASSURANCE:
 - 1. Qualifications and Organization Report: The Contractor shall furnish a qualification and organization report. The report shall describe the qualifications of the certified supervisor, certified risk assessor, and certified workers. The report shall include an organization chart showing the Contractor's personnel by name and title and project specific responsibilities and authorities. The report shall describe the qualifications of the laboratories selected for this project. The report shall be signed by the Contractor and the certified supervisor to indicate that all personnel and laboratories comply with certification and experience requirements of this Section and that project personnel have been given the authority to complete the tasks assigned to them.

2. PRODUCTS:

- A. GENERAL: All products and materials required for site remediation shall conform to the requirements of federal and state requirements and the City of San Diego.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. WORK PROCEDURES:
 - 1. General: All labor, equipment and procedures required for site remediation shall conform to the requirements of federal and state requirements and the City of San Diego.
 - 2. Supplemental Special Conditions:
 - a. Section 703: Encountering or Releasing Hazardous Substances.
 - b. Section 705: Water Discharges.
 - 3. Related Documents:
 - a. Appendix A: Remedial Action and Property Mitigation Plan.
 - b. Appendix F: Property Mitigation Plan (PMP), Approval from Department of Environmental Health.
 - c. Appendix G: Environmental Secondary Study, Fire Station No. 2 (Bayside).
 - d. Appendix H: Geotechnical and Fault Investigation.
 - e. Appendix I: Water Pollution Control Plan (WPCP).
 - f. Appendix J: Asbestos Containing Materials (ACM) and Lead-based Paint Survey (LBP).

* End Division 02 *

Division 03 - CONCRETE

CONCRETE FORMING AND ACCESSORIES Section 03 10 00

1. GENERAL:

- A. SUMMARY: Provide Concrete Forming and Accessories, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Concrete Institute (ACI):
 - a. General: Manual of Concrete Practice (MCP).
 - b. ACI 117: Specifications for Tolerances for Concrete Construction and Materials.
 - c. ACI 301: Specifications for Structural Concrete For Buildings.
 - d. ACI 318: Building Code Requirements for Structural Concrete & Commentary.
 - e. ACI 347R: Recommended Practice for Concrete Formwork.
 - f. ACI SP-66: Detailing Manual.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers standard specifications.
 - 3. The Engineered Wood Association (APA): Standard Grading Rules.
 - 4. National Institute of Standards and Technology (NIST):
 - a. NIST PS 1: Construction and Industrial Plywood.
 - b. NIST PS-20: American Softwood Lumber Standard.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Shop Drawings:
 - a. General: Submit manufacture and installation details per ACI 315, including fastenings, for review.
 - b. Design Requirements: Design and engineer fabrication, assembly and support of formwork per ACI and CBC requirements.
 - c. Shoring: Submit proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.
- D. QUALITY ASSURANCE:
 - 1. General: Installer specializing in the work of this Section with minimum three (3) years documented experience.
 - 2. Structural Engineer: Design formwork under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State of California.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Forms:
 - a. Wood:
 - 1. Lumber: NIST PS-20 Construction grade douglas fir.
 - 2. Plywood:
 - a) General: NIST PS 1, C Grade douglas fir, 5/8 inch minimum; sound undamaged sheets with clean true edges.
 - b) High Density Overlaid (MDO) Plywood: APA exterior type, single face.
 - 3. Metal: Smooth, non staining metal plate free of surface irregularities.
 - b. Tubular Columns: Spirally wound laminated fiber as shown, with contact surface treated with release agent.
 - c. Void Forms: Moisture resistant with biodegradable paper face.
 - d. Chamfer Strips: Wood, metal, PVC, or rubber strips; 3/4 inch by 3/4 inch minimum, unless otherwise shown.
 - 2. Fasteners: As required to maintain formwork in place while placing and curing concrete; non-staining.
 - 3. Form Ties: Factory-fabricated, non-staining, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 4. Spreaders: Metal; wood not permitted.
 - 5. Form Release Agent: Colorless mineral oil that will not stain concrete or impair natural bonding characteristics of coating intended for use on concrete.
 - 6. Expansion Joint Material: ASTMD1751, asphalt-saturated cellulosic fiber, or ASTMD1752, poly

- or self-expanding cork; preformed, ½ inch thick, unless otherwise shown.
7. Waterstops:
 - a. General: Flexible rubber with profile as shown, manufactured by Greenstreak, Inc. Factory fabricate corners, intersections, and directional changes.
 - b. Alternate Manufacturers: Comparable products manufactured by Progress Unlimited Inc., or accepted equal.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Coordinate placement of work specified under other Sections in forming and placing openings, or embedded items placed within formwork.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

* * *

CONCRETE REINFORCING

Section 03 20 00

1. GENERAL:

- A. SUMMARY: Provide Concrete Reinforcing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Concrete Institute (ACI):
 - a. General: Manual of Concrete Practice (MCP).
 - b. ACI 301: Specifications for Structural Concrete For Buildings.
 - c. ACI 303R: Guide to Cast-in-Place Architectural Concrete Practice.
 - d. ACI 315: Details and Detailing of Concrete Reinforcing.
 - e. ACI 318: Building Code Requirements for Structural Concrete.
 - f. ACI 347R: Recommended Practice for Concrete Formwork.
 - g. ACI SP-66: Detailing Manual.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers standard specifications.
 - 3. American Welding Society (AWS): AWS D1.4 - Structural Welding Code.
 - 4. Concrete Reinforcing Steel Institute (CRSI):
 - a. General: Concrete Reinforcing Steel Institute Manual of Standard Practice.
 - b. CRSI 63: Placing Reinforcing Bars.
 - c. CRSI 65: Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Shop Drawings: Submit manufacture and installation details per ACI 315, for review. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules, including supporting and spacing devices and fastenings. Include special reinforcement required for openings through concrete structures.
 - 3. Test Reports: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - 4. Certificates:
 - a. General: Submit mill test and chemical analysis certificates for all reinforcing steel delivered to the site.
 - b. Welding: Submit copies of certificates for welding procedures and personnel.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Reinforcement:
 - a. Bars:
 - 1. General: ASTM A615, deformed; Grade 60; ASTM A 706 where specifically shown or welding is required.
 - 2. Stirrups: Same grade as for reinforcement bars.
 - 3. Dowels: Same grade as bars to which dowels are connected.
 - b. Welded Wire Fabric: ASTM A185, Plain Type; 6x6-W1.4xW1.4 and 6x6-W2.9xW2.9 as shown, in flat sheets, unless otherwise noted
 - 2. Chairs, Bolsters, Bar Supports, Spacers:
 - a. General: CRSI Class 2; sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture. Do not use wood, brick or galvanized materials.
 - b. Special Units Adjacent to Weather Exposed Concrete Surfaces: CRSI Class 1; Plastic coated steel type; size and shape as required.
 - c. Support is no Closer to Concrete Surface Than 1/2 Inch: CRSI Class 3 wire.
 - d. Supports Placed Against Ground: Precast concrete blocks not less than 4 inches square with embedded wire.
 - 3. Tie Wire: ASTM A82, as shown.
 - 4. Welding Electrodes: AWS D1.4, low hydrogen, E7093054 series.
- B. FABRICATION:
 - 1. General: Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice." Where specific details are not shown, fabricate per ACI 315. Do not bend or straighten reinforcement in manner that will injure material. Bars with kinks or bends not shown, and heating of bars for bending is not permitted.
 - 2. Welding: Per AWS D1.4.
 - 3. Spirals: Provide 1-1/2 finishing turns top and bottom minimum. Provide tension lap splices of

- 48 bar diameters minimum, with 135° hooks into the confined core at ends, where required.
4. Shop Assembled Cages: Provide spacers, bracing and ties sufficient to prevent deformation of cages during transportation, placement and pouring of concrete.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects.
2. Measurements: Take field measurements; report variance between plan and field dimensions.
3. Protection: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Formwork: Refer to Section 03 10 00 - CONCRETE FORMING AND ACCESSORIES.
3. Vapor Barrier: Do not cut or puncture while placing reinforcement; repair damage and reseal before placement of concrete.
4. Reinforcement:
 - a. General: Comply with the CRSI "Manual of Standard Practice" for placement of reinforcement.
 - b. Preparation: Clean reinforcement of rust and mill scale, earth, moisture, and other foreign materials before fabrication or placement.
 - c. Site Fabrication: Construct as shown. Do not bend or straighten reinforcement in manner that will injure material; heating of bars for bending is not permitted.
 - d. Welding: Per AWS D1.4. Do not tack-weld crossing reinforcing bars.
 - e. Placement:
 1. General: Install in longest practical lengths. Accurately place, support, and secure reinforcement against displacement. Locate and support reinforcement with supports to maintain required concrete cover and minimize sagging.
 2. Wire Ties: Set with ends directed away from exposure, into concrete.
 - f. Bars:
 1. Laps: Provide minimum center-to-center distance between parallel bars of 2-1/2 times diameter, 1-1/2 inches or 2-1/2 times maximum size coarse aggregate. Offset laps in adjacent bars.
 2. Splices: Lap 60 diameters, unless otherwise shown, and wire tie bars.
 3. Dowels:
 - a) General: Place as shown; grease loose ends to prevent concrete from bonding to dowel. Sleeves may be used when approved in writing by the Architect. Install through expansion joints.
 - b) At Masonry Reinforcement: Coordinate location of dowels in footings to match masonry reinforcement requirements. Refer to Section 04 21 13 - BRICK MASONRY and 04 22 00 - CONCRETE UNIT MASONRY.
 4. Welded Wire Fabric: Lap edges and ends of adjoining sheets at least one mesh spacing, unless otherwise indicated. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
 - g. Embedded Components:
 1. General: Install straight, level and plumb prior to concrete placement; brace, anchor and support items attached to reinforcement to prevent displacement or distortion.
 2. Inserts: Coordinate work of other Sections in attaching bolts, anchors, and other components to reinforcement, as required.

* * *

CAST-IN-PLACE CONCRETE

Section 03 30 00

1. GENERAL:

- A. SUMMARY: Provide Cast-in-Place Concrete, as shown and specified per Contract Documents.
- B. REFERENCES:
1. American Coal Ash Association (ACAA): Standards.
 2. American Concrete Institute (ACI):
 - a. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - b. ACI 211.2: Recommended Practice for Selecting Proportions for Normal Weight Concrete.
 - c. ACI 232.2R: Use of Fly Ash in Concrete
 - d. ACI 301: Specifications for Structural Concrete For Buildings.
 - e. ACI 302.1R: Guide for Floor and Slab Construction.
 - f. ACI 303R: Guide to Cast-in-Place Architectural Concrete Practice.
 - g. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - h. ACI 304.2R: Placing Concrete by Pumping Methods
 - i. ACI 305R: Hot Weather Concreting.
 - j. ACI 306R: Cold Weather Concreting.
 - k. ACI 308: Standard Practice for Curing Concrete.
 - l. ACI 315: Details and Detailing of Concrete Reinforcing.
 - m. ACI 318R: Building Code Requirements for Reinforced Concrete.
 - n. ACI 347R: Recommended Practice for Concrete Formwork.
 - o. ACI SP-15: Field Reference Manual.
 - p. ACI SP-66: Detailing Manual.
 3. American Association of State Highway and Transportation Officials (AASHTO): AASHTO M 295 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 4. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers standard specifications.
 - b. ASTM C39: Compressive Strengths Cylindrical Concrete Specimens.
 - c. ASTM C94: Ready-Mixed Concrete.
 - d. ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - e. ASTM E329: Agencies Engaged in the Testing and/or inspection of material used in construction.
 5. National Ready-Mix Concrete Association (NRMCA): Check List for Certification of Ready Mix Concrete Production Facilities.
- C. SUBMITTALS:
1. General: Submit product data, shop drawings and samples. Contractor to provide step-by-step instructions highlighting the methods used to prepare forms, pour concrete, finish and cure concrete so process can be imitated once the concrete sample is approved.
 2. Design Mixes: Submit concrete mix designs for review; include alternate mix designs required for characteristics of materials, project conditions, weather, test results, or other circumstances that warrant adjustments.
 3. Test Reports: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 4. Placement Records: Keep on job site until completion, and open to inspection, record showing time and date and accurate location of placement of concrete in the structure.
 5. Certificates: Submit certification stating that products used to manufacture concrete delivered to the site meet or exceed the material and testing requirements of these specifications.
 6. Closeout: Submit maintenance data.
- D. QUALITY ASSURANCE:
1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.
 2. Pre-construction Conference: Conduct conference at Project site with representatives of each entity directly concerned with cast-in-place concrete to attend, including Contractor's superintendent, testing agency representative, ready-mix concrete producer and concrete subcontractor. Review concrete mix designs and examine procedures for ensuring quality of concrete materials.
 3. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
 4. Testing: Tests by Testing Laboratory appointed by Owner and under directions of Architect; expense of testing borne by Owner.

2. PRODUCTS:

A. MATERIALS:

1. Concrete:

- a. Cement: ASTM C150, Type I or II.
- b. Aggregates:
 1. General: ASTM C33, uniformly graded.
 2. Lightweight: ASTM C330.
- c. Water: ASTM C94, clean and free from deleterious amounts of acids, alkalis, scale, or organic materials.
- d. Admixtures:
 1. General: Manufacturer certified to contain not more than 0.1 percent water-soluble chloride ions by mass; compatible with other admixtures and cementitious materials. Admixtures containing calcium chloride or thiocyanates not allowed.
 2. Air Entrainment:
 - a) General: ASTM C260; Airmix 200 manufactured by Euclid Chemical Co.
 - b) Alternate Manufacturers: Comparable products manufactured by W.R. Meadows, Inc., or accepted equal.
 3. Water Reducing:
 - a) General: ASTM C494 to improve placing, reduce water cement ratio, and ultimate shrinkage; manufactured by the Euclid Chemical Co. Admixture must receive prior approval of Architect and be included in original mix design.
 - b) Alternate Manufacturers: Comparable products manufactured by the Sika Corp., or accepted equal.
 - c) High-Range: Type F; Eucon 37.
 - d) Accelerating: Type E.
 - e) Retarding: Type D; Eucon WR-75.
 4. Integral Color Concrete: Refer to Section 03 35 19 - COLORED CONCRETE FINISHING.
 5. Fly Ash: ASTM C618, Class C, Table 1 and 2.
- e. Surface Treatments:
 1. Hardener:
 - a) General: "Rez-Seal" manufactured by Euclid Chemical Co.; color selected by the Architect.
 - b) Alternate Manufacturers: Comparable products manufactured by L. M. Scofield Co., or accepted equal.
 2. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent gray aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- f. Membrane Curing Compound: ASTM C309, Type 1D clear (with fugitive dye), guaranteed not to affect bond of subsequent finish materials. Curing compound and areas to receive it must be accepted by Architect before application.
- g. Sealer:
 1. General: Burke Spartan-Cote II WB cure-seal-hardener manufactured by Burke/Edoco Division of Dayton Superior.
 2. Alternate Manufacturers: Comparable products manufactured by BASF Building Systems, or accepted equal.
- h. Water Repellent: Refer to Section 07 19 00 - WATER REPELLENTS.
- i. Related Materials:
 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 2. Non-Shrink Grout:
 - a) General: MasterFlow 555 manufactured by BASF Building Systems.
 - b) Alternate Manufacturers: Comparable products manufactured by Euclid Chemical Co., or accepted equal.
 3. Bonding Agent for Patching:
 - a) General: "Flex-Con" manufactured by Euclid Chemical Co.
 - b) Alternate Manufacturers: Comparable products manufactured by Degussa Building Systems, or accepted equal.

B. MIXES:

1. Concrete Proportions:

- a. General: Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases.

- b. Normal-weight: Per ACI 211.1 and ACI 301.
- c. Lightweight: Per ACI 211.2 and ACI 301.
- d. Testing: Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.
- 2. Concrete Design:
 - a. Designed Strength of Concrete:
 - 1. General: Proportion normal-weight concrete mix as shown, with 1 inch maximum size aggregate; entrained air 6 percent.
 - 2. Strength and Slump: As shown.
 - b. Limiting Quantities and Minimum Strength: Design concrete for strength per Chapter 19A of CBC.
- 3. Mixing of Concrete:
 - a. General: All concrete shall be mixed until there is uniform distribution of material and mass is uniform and homogeneous; mixer must be discharged completely before the mixer is recharged. Conform to requirements of CBC Section 1905A.2.3, Method B.
 - b. Ready-Mix Concrete: Mix and deliver in accordance with the requirements set forth in CBC Section 1905A.8.2. Furnish batch ticket information.
 - c. Admixtures:
 - 1. General: Verify compatibility of concrete admixtures when multiple admixtures are called for in a specific mix.
 - 2. Integral Color: Add color admixture at batch plant. Maintain same brand of cement, source of sand and water/cement ratio for each load of the same color.
 - d. Collated Fibrillated Polypropylene Fiber: Added to mix at mixing plant; not permitted in job mixed concrete.
 - e. Job Mixed Concrete:
 - 1. General: Use batch mixer of approved type, with capacity to handle one or more full sack batches, no split sack batches permitted; furnish batch ticket information. Operate mixer as recommended by manufacturer. Record approximate location of final deposit in structure.
 - 2. Mixer Capacity of 1 Cubic Yard or less: Mix minimum one and one half (1-1/2) minutes after all materials are in drum.
 - 3. Mixer Capacity of 1 Cubic Yard or More: Increase mixing time by 15 seconds for each additional 1 cubic yard, after all materials are in drum.
 - 4. Handling and Mixing of Concrete: Architect may order removal of any equipment which in his opinion is insufficient or in any way unsuitable.
- 4. Grout: Provide mortar containing same proportions of cement and sand as used for concrete, with ultimate compressive strength of 3000 psi.

3. EXECUTION:

A. PREPARATION:

- 1. Scheduling: Notify Architect and Structural Engineer at least 48 hours prior to placing of concrete.
- 2. Environmental Requirements: Per ACI 305R and ACI 306R.
- 3. Examination: Examine conditions of work in place before beginning work; report defects. Verify granular sub-base materials have been placed to the depth as shown.
- 4. Measurements: Take field measurements; report variance between plan and field dimensions.
- 5. Storage: Store cement in weathertight building, permitting easy inspection and identification. Protect from dampness; lumpy or stale cement will be rejected.
- 6. Protection: Protect finish surfaces adjacent to locations scheduled for placement of concrete. Inspect forming placed against existing work and establish a tight, leak-proof seal before concrete is poured. Replace finish work defaced by concrete placement operations.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Tolerances: Refer to Section 01 43 00 - QUALITY ASSURANCE. Install to allow application of subsequent finish materials within specified tolerances.
- 3. Formwork: Refer to Section 03 10 00 - CONCRETE FORMING AND ACCESSORIES.
- 4. Reinforcement: Refer to Section 03 20 00 - CONCRETE REINFORCING.
- 5. Cast-in-place Concrete:
 - a. General: Placement of forms, inserts and reinforcements are subject to approval of Architect. Notify Architect and Structural Engineer at least 48 hours prior to placement of concrete.
 - b. Cleaning:
 - 1. General: Remove dirt, wood chips, sawdust and other debris before concrete pour; use compressed air at inaccessible areas.

2. Reinforcing: Clean reinforcement and other embedded items of substances that might impair bonding, prior to placement of concrete.
3. Previously Placed Concrete: Roughen to 1/4 inch amplitude; clean with steel brush prior to applying bonding agent.
- c. Placing of Concrete:
 1. General: Maintain records for placement of all concrete. Place concrete in dry conditions; keep excavations free of water, ice, loose soil or debris.
 2. Weather Requirements: Per ACI 305R (Hot) and ACI 306R (Cold). Additionally, hot weather is defined as any period in which temperature exceeds 85 degrees F.
 3. Transportation: Handle concrete from mixer to place of deposit as rapidly as possible; using methods to prevent separation or loss of ingredients. Deposit in final position; avoid rehandling or flowing. Do not place partially hardened concrete in work. Do not wheel placement containers directly on top of reinforcing steel.
 4. Placement:
 - a) General: Place concrete continuously between predetermined expansion, control and construction joints. Do not break or interrupt placement of concrete in manner that cause cold joints to occur.
 - b) Footings: Place footings in one continuous pour.
 - c) Concrete Slabs:
 - 1) General: Lay slabs to required lines and grades, in pattern shown. Water subgrade at exterior concrete the night before placement; dampen again immediately before placement; standing water not allowed.
 - 2) Joints: Refer to placement within formwork and upon slab finishes.
 - 3) Flatness: Per ASTM E1155 - Determining Flatness and Levelness Using the F-Number System, or using a 10'-0" long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/4 inch.
 - d) Concrete in Forms:
 - 1) General: Consolidate placed concrete with mechanical vibrating equipment. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced intervals no deeper than the visible effectiveness of the vibrator. Rapidly penetrate placed layer and at least 6 inches into preceding layer of concrete. Do not insert vibrators into lower layers that have begun to lose plasticity. Limit duration each insertion to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items. Do not cause mix components to separate.
 - 2) Floor Slabs: Deposit and consolidate in a continuous operation, within limits of construction joints, until placement of a panel or section is complete. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners. Maintain reinforcement in position on chairs during concrete placement. Screed slab surfaces with a straightedge and strike off to correct elevations. Slope surfaces uniformly to drains where required. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
 5. Horizontal Construction Joints:
 - a) General: Keep exposed concrete face of construction joints continuously moist after initial set until placement of concrete; thoroughly clean contact surface by exposing solidly embedded aggregate, or use bonding agent when fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - b) Placement:
 - 1) General: Unless otherwise shown, place perpendicular to main reinforcement; continue reinforcement across construction joints. Locate joints for beams, suspended slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 2) Horizontal Joints: Locate in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 3) Vertical Joints: Space in walls as shown. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Grout: Use at construction joints, and where shown.
 7. Compacting:
 - a) General: Thoroughly work concrete around reinforcement, embedded components and into corners of forms. Consolidate concrete by internal vibration, only. Do not puddle, tamp or vibrate concrete which has already taken initial set or continue long enough cause segregation of material.

- b) Slabs: Consolidate concrete on grade by spading and puddling and internal vibration.
- c) Formwork: Consolidate concrete in forms with high speed internal vibrators.
- d. Concrete Finishes:
 - 1. Slab Finish:
 - a) General: Uniformly spread, screed and float concrete.
 - b) Float: Apply at tile setting beds, where shown.
 - c) Trowel: Apply two (2) steel troweling operations at surfaces to receive carpet, resilient materials, thinset tile and where left exposed, finished to achieve burnished surface. Follow second troweling with light brooming perpendicular to direction of traffic to form non-slip surface.
 - d) Broom: Apply medium broom finish at exterior walks, ramps and stairs, perpendicular to direction of traffic flow.
 - e) Accessible Routes of Travel: Provide concrete paving and concrete finishes along accessible routes of travel at least as slip-resistant as that described as a medium salted finish for slopes of less than 6%, and slip-resistant at slopes of 6% or greater.
 - f) Slip-Resistive Aggregate: Uniformly spread 25 pounds per 100 square feet of dampened slip-resistive aggregate over surface in not more than two (2) applications. Tamp aggregate flush with, but do not press below surface. Apply trowel finish. After curing, lightly work surface with a steel wire brush and water to expose aggregate.
 - g) Hardener: Apply where shown.
 - h) Contraction Joints:
 - 1) General: As shown; 6'-0" maximum at exterior concrete.
 - 2) Grooved Joints: Mark off exposed joints, where indicated, with 1/4 inch radius edging tool. Markings to be clean cut, straight and square with respect to border. Tool edges of exposed expansion and control joints, border edges, and wherever concrete adjoins other material or vertical surfaces.
 - 3) Sawed Joints: Form 1/8-inch wide joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Do not cut into concrete until it is sufficiently cured that cutting action will not tear, abrade, or otherwise damage surface, but before concrete begins to develop contraction cracks.
 - 2. Formed Surfaces:
 - a) Rough-Formed: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
 - b) Smooth-Formed:
 - 1) General: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
 - 2) Exposed Finish: Apply smooth-rubbed, grout-cleaned, or cork-floated finish applied to exposed smooth-formed finished surface.
 - 3. Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
 - 4. Sealer: Apply where shown.
- e. Curing:
 - 1. General: Refer to ACI 308. Protect concrete from premature drying for minimum five (5) days following pour.
 - 2. Exterior Slabs: Cover and cure with membrane curing or moist sand; upon completion wash clean.
 - 3. Sealer: Apply where shown.
 - 4. Concrete in Forms: Keep wet until forms are stripped.
- f. Removal of Forms:
 - 1. General: Sequence and time in manner to insure safety of concrete structure; remove without damage to concrete surfaces.
 - 2. Stripping:
 - a) General: Maintain forms in place for not less than the following number of days when air temperature in contact with concrete is 60 degrees F or above. Add an additional day for each day that temperature falls below 60 degrees F, unless otherwise directed.
 - b) Slab Edge Screeds: Five (5) days.
 - c) Forms: Five (5) days.

- g. Isolation Joints: After removal of formwork, install joint-filler strips at slabs-on-grade, junctions with vertical surfaces and other locations, as shown. Place in lengths as long as practicable; lace or clip sections together as required. Extend full width and depth of joint, terminating flush with finished concrete and not less than ½ inch or more than 1 inch below finished surface where application of joint sealants are shown.
 - h. Defective Concrete:
 - 1. General: Remove or cut out defective concrete and repair before concrete is completely cured, as directed by Architect.
 - 2. Defective Concrete is:
 - a) General: Concrete not meeting specified 28-day strength.
 - b) Durability and Appearance: Concrete containing rock pockets, voids, spalls, cracks, exposed reinforcing, or other defects.
 - c) Alignment: Incorrectly formed concrete, out of plumb or level.
 - d) Deleterious Materials: Concrete containing embedded wood or other debris.
 - e) Unauthorized Patching: Concrete with patched voids that were not filled under Architect's direction.
 - f) Embedded Items: Concrete not containing required embedded items.
 - 3. Patching:
 - a) General: Repair exposed concrete to match surrounding concrete finish as required by the Architect.
 - i. Water Repellent: Install at vertical walls where shown; refer to Section 07 19 00 - WATER REPELLENTS.
 - j. Protection: After placement, finishing and completion of required repairs, protect exposed corners, edges, and surfaces of concrete from damage, including staining and contamination during remainder of construction period.
- C. FIELD QUALITY CONTROL:
- 1. General: Per CBC, Section 1905.6; agency selected and paid for by Owner.
 - 2. Field Testing:
 - a. General: Take three (3) cylinders and test, for each 50 cubic yards of each concrete mix being placed each day. Test first cylinder at the age of 7 days and the other at 28 days; cylinder for 28-day test will not be broken if cylinder for 7-day test meets 28 day strength. Hold third cylinder for 56 day test, if required.
 - b. Reinforcement: Make one (1) tensile test and one (1) bend test of specimen taken from each 10 tons of steel delivered to the site.
 - 3. Retesting: Cost of retests or coring because of understrength, questionable or defective concrete will be paid for by Contractor.

* * *

COLORED CONCRETE FINISHING

Section 03 35 19

1. GENERAL:

- A. SUMMARY: Provide Colored Concrete Finishing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Concrete Institute (ACI): ACI 302.1R - Guide for Concrete Floor and Slab Construction.
 - 2. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C779: Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - c. ASTM C805: Standard Test Method for Rebound Number of Hardened Concrete.
 - d. ASTM G152: Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
 - e. ASTM G153: Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Samples: Manufactures standard colors.
 - 3. Closeout: Submit maintenance data.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; applicator manufacturer certified.
 - 2. Pre-application Conference: Determine condition of concrete and application methods.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance:
 - 1. General: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 - 2. Stains and Finishes: Green Seal Standard GS-47.
 - 2. Colored Concrete Finish:
 - a. Solvent-based Concrete Dye:
 - 1. General: Ameripolish Concrete Dye manufactured by American Decorative Concrete Supply Co.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - 3. Penetrating Agent: AmeriPolish EnhancerPro Penetrating Agent.
 - b. Hardening and Sealing Agent:
 - 1. General: Retro-Plate 99 System manufactured by Advanced Flooring Products.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - c. Cleaner: As recommended by manufacturer.
 - d. Water: Potable.
- B. MIXES:
 - 1. General: Mix dye and penetrating agent as recommended by the manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. General: Test to ensure dye and hardening/sealing agent compatibility prior to beginning the project installation.
 - 2. Scheduling: Verify that newly placed concrete has been cured 28 days minimum prior to dye application.
 - 3. Environmental Requirements: Maintain an ambient temperature of between 50 and 90 F during and at least 48 hours after application.
 - 4. Examination: Examine conditions of work in place before beginning work; report defects.
 - 5. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 6. Protection: Protect surrounding areas from over-spray, run-off and tracking.
 - 7. Surface Preparation:
 - a. New Concrete: Verify that liquid curing materials have not been used and that flatwork has been cured with new, unwrinkled, non-staining, high quality curing paper or a breathable curing blanket acceptable to dye manufacturer.

- b. Cleaning: Immediately prior to dyeing, thoroughly clean the concrete as recommended by dye manufacturer. Allow floor to dry completely prior to application of floor stain.
 - 8. Field Samples: At location selected by the City's Representative, prepare a 4'-0" x 4'-0" sample for review and approval. Construct sample using processes and techniques intended for use on permanent work, including curing procedures. Locate and retain sample either in a inconspicuous location that will be covered by flooring or a separate moveable mockup as directed by the City's Representative.
- B. APPLICATION:
- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Concrete Dye: Apply as directed by manufacturer.
 - 3. Hardening and Sealing Agent: Apply as directed by manufacturer; polish to required sheen level

* * *

1. GENERAL:

- A. SUMMARY: Provide Precast Concrete Stair Treads, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American Welding Society (AWS): AWS D1.1 - Structural Welding Code.
 - 3. Precast/Prestressed Concrete Institute (PCI):
 - a. General: Manual for Structural Design of Architectural Precast Concrete.
 - b. MNL-117: Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Precast Concrete Bollards:
 - a. General: Custom Bollards manufactured by Dura Art Stone; configuration and size as shown.
 - b. Alternate Manufacturers: No equals will be accepted.
 - c. Portland Cement: ASTM C150, Type III, high early strength.
 - d. Aggregate: ASTM C33.
 - e. Water: ASTM C94, clean and free from deleterious amounts of acids, alkalis, scale, or organic materials.
 - f. Color:
 - 1. Admixture: "Lithochrome" manufactured by the L. M. Scofield Co.; color selected by the Architect.
 - 2. Sealer: DNS-400 Sprayable Acrylic Sealer manufactured by American Decorative Concrete Supply Co.
 - g. Reinforcing Steel: Manufacturers standard.
 - h. Sealer: Manufacturer's standard.
 - i. Anchorage: As recommended by manufacturer.
- B. MIXES:
 - 1. Concrete Mix: 5,000 psi compressive strength at 28 days.
 - 2. Finish: Manufacturers standard light sandblasted; factory sealed.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Delivery: Handle and store in accordance with manufacturer's recommendations.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Anchorage: Set in Concrete per 03 30 00 - CAST-IN-PLACE CONCRETE as shown.

* * *

PRECAST CONCRETE STAIR TREADS

Section 03 48 19

1. GENERAL:

- A. SUMMARY: Provide Precast Concrete Stair Treads, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American Welding Society (AWS): AWS D1.1 - Structural Welding Code.
 - 3. Precast/Prestressed Concrete Institute (PCI):
 - a. General: Manual for Structural Design of Architectural Precast Concrete.
 - b. MNL-117: Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Precast Concrete Stair Treads:
 - a. General: Modern Profile Steptreads manufactured by Stepstone, Inc., or accepted equal, with integral detectable warning stripe.
 - b. Portland Cement: ASTM C150, Type III, high early strength.
 - c. Aggregate: ASTM C33.
 - d. Water: ASTM C94, clean and free from deleterious amounts of acids, alkalis, scale, or organic materials.
 - e. Exposed Aggregate Surface: As selected by the Architect.
 - f. Reinforcing Steel:
 - 1. General: ASTM A185 galvanized welded wire mesh, No. 7 and No. 10.
 - 2. Long Span: ASTM A615, galvanized; No.3 deformed bar cage.
 - g. Sealer: Manufacturer's standard.
 - h. Anchorage: As recommended by manufacturer.
 - 2. Handrail Brackets: Refer to Section 05 50 00 - METAL FABRICATIONS.
- B. MIXES:
 - 1. Concrete Mix: 5,000 psi compressive strength at 28 days.
 - 2. Finish: Exposed aggregate; factory sealed.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Delivery: Handle and store stair treads in accordance with manufacturer's recommendations. Do not rest treads on the riser sections.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Install stair treads aligned, level and with uniform treads and risers throughout the extent of the stair. Where cutting is necessary, use powered masonry saw. Do not install stair treads having excessively stained, defaced, or damaged faces, edges, or corners where to remain exposed. Remove dust and dirt from stair tread units using oil-free compressed air.
 - 2. Steel Stair Supports:
 - a. General: Refer to Section 05 50 00 - METAL FABRICATIONS. Weld plates on treads to steel supports as shown,
 - b. Welding: Per AWS D1.1.

* End Division 03 *

Division 04 - MASONRY

COMMON WORK RESULTS FOR MASONRY Section 04 05 10

1. GENERAL:

A. SUMMARY: Provide Common Work Results for Masonry, as shown and specified per Contract.

B. REFERENCES:

1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C144: Aggregate for Masonry Mortar.
 - c. ASTM C150: Portland Cement.
 - d. ASTM C207: Hydrated Lime for Masonry Purposes.
 - e. ASTM C404: Aggregates for Grout.
 - f. ASTM C1019: Method of Sampling and Testing Grout.
2. California Building Code (CBC): Section 2102.

C. SUBMITTALS:

1. General: Submit product data, shop drawings, samples and test reports.
2. Mix Design for Mortar and Grout: Submit for review.
3. Supplier's Certificates: Indicating materials are in compliance with specifications, including but are not necessarily limited to aggregates, cement and admixtures.

D. QUALITY ASSURANCE:

1. Tests and Inspections:
 - a. All tests and inspections herein are to be performed by an independent testing laboratory approved by the building official.
 - b. Mortar and Grout Tests:
 1. General: At the beginning of Masonry Work, take 1 test sample of mortar and grout on 3 successive working days; thereafter once per week with at least one sample taken for each 5000 square feet of wall area, or fraction thereof.
 2. Test Specimens: Per UBC Standard 21-18 for grout and UBC Standard 21-16 for mortar; continuously stored in moist air until tested.
 3. Compressive Strength: Mortar not less than 1800 psi at 28 days; grout not less than 2000 psi at 28 days.
 - c. Special Inspector: Per CBC Section 1704.5 and 2105 during the placement of units, reinforcing steel, grouting operations and taking of test specimens.

2. PRODUCTS:

A. MATERIALS:

1. Mortar and Grout:
 - a. Cement: ASTM C150, Type I or II, grey color.
 - b. Lime Putty:
 1. General: Made from hydrated lime or quicklime.
 2. Hydrated Lime: ASTM C207, Type S; slaked for not less than 48 hours and cool when used.
 3. Quicklime: ASTM C5; slake lime and screen through a No. 16 mesh sieve. Store and protect slaked and screened lime putty for not less than 10 days.
 - c. Aggregate:
 1. Mortar: ASTM C144; light grey color
 2. Grout: ASTM C404.
 3. Mortar Color: Mineral oxide pigment; color as selected by the Architect.
 - d. Admixtures:
 1. General: "Sika Grout Aid" manufactured by the Sika Corp.
 2. Alternate Manufacturers: Comparable products manufactured by Laticrete International, Inc., or accepted equal.
 3. Cold-Weather: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.
 4. Water-Repellent: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
 - e. Water: Clean and potable.

2. Masonry Reinforcing: Refer to Section 03 20 00 - CONCRETE REINFORCING.
- B. MIXES:
1. Mortar:
 - a. General: ASTM C270, Type S using the property specification.
 - b. Ready Mixed Mortar: ASTM C1142, Type RS.
 - c. Strength: Provide minimum 28 day strength of 1,900 psi per CBC Section 2105.2.2.1.2.
 - d. Mixing:
 1. General: Thoroughly mix mortar ingredients per ASTM C270 in quantities needed for immediate use. Maintain sand uniformly damp immediately before the mixing process. Add admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration. Do not use anti-freeze compounds to lower the freezing point of mortar. If water is lost by evaporation, re-temper only within one (1) hour of mixing. Use mortar within one (1) hour after mixing.
 2. Admixtures: Proportioned, added and mixed per manufacturer's directions.
 2. Grout:
 - a. General: Ready mixed grout per ASTM C94, mixed in accordance with ASTM C476, fine grout as required.
 - b. Strength: As shown.
 - c. Admixtures: Per manufacturer's instructions; mix uniformly. Do not use anti-freeze compounds to lower the freezing point of grout.
 3. Clay Content: Not to exceed 2% of sand content or 6% of cement content.
 4. Partial Sack Batches: Not permitted.

3. EXECUTION:

- A. PREPARATION:
1. Examination: Examine conditions of work in place before beginning work; report defects.
 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Placement: Refer to Section 04 22 00 - CONCRETE UNIT MASONRY and 32 14 16 - BRICK UNIT PAVING.

* * *

BRICK MASONRY

Section 04 21 13

1. GENERAL:

- A. SUMMARY: Provide Brick Masonry, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Concrete Institute (ACI): ACI 530/530.1 - Building Code Requirements for Masonry Structures.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Brick Industry Association (BIA): Standards.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and test reports.
 - 2. Samples:
 - a. Masonry Units: One of each type, texture and color.
 - b. Color Mortar: Full range of samples.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Brick Units:
 - a. General: Manufactured by the H.C. Muddox Co., a Division of Pacific Coast Building Products and distributed by RCP Block and Brick, Inc.; color selected by the Architect.
 - b. Alternate Manufacturers: Comparable products manufactured by the Pacific Clay Products, Inc., or accepted equal.
 - c. Building Brick:
 - 1. General: ASTM C62, Grade SW; solid units.
 - 2. Type and Size: Modular; 7-5/8 inches long x 2-1/4 inches high x 3-5/8 inches deep.
 - 2. Reinforcement: Refer to Section 03 20 00 - CONCRETE REINFORCING.
 - 3. Mortar and Grout: Refer to Section 04 05 00 - COMMON WORK RESULTS FOR MASONRY.
 - 4. Water Repellent: Refer to Section 07 19 00 - WATER REPELLENTS.
- B. MIXES:
 - 1. General: Refer to Section 04 05 00 - COMMON WORK RESULTS FOR MASONRY.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Convene pre-installation conference one (1) week prior to commencing work of this section; confirm scheduling and coordination requirements.
 - 2. Environmental Requirements:
 - a. Cold Weather: Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and for 48 hours after completion of masonry work.
 - b. Hot Weather: Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and for 48 hours after completion of masonry work.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.
 - 4. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 5. Protection:
 - a. Storage: Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. Pile masonry units on plant platforms in dry location. Protect masonry units during freezing weather with tarpaulins or other suitable material.
 - b. Stains: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed. Remove grout, mortar, or soil immediately on contact with masonry.
 - 6. Surface Preparation: Clean surfaces to be in contact with mortar or grout free of deleterious materials.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

2. Coursing:
 - a. General: Establish lines, levels, and coursing indicated. Protect from displacement. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
 - b. Brick Units:
 1. Bond: As shown.
 2. Coursing: Three (3) units and three (3) mortar joints to equal 8 inches.
 - c. Mortar Joints: Concave.
 3. Reinforcement and Anchorage: As shown.
 4. Placing and Bonding:
 - a. General: Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work. Buttering corners of joints or excessive furrowing of mortar joints are not permitted. Remove excess mortar as work progresses. Interlock intersections and external corners. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
 - b. Cutting: Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 5. Cutting and Fitting: Cut and fit as required; coordinate with other Sections of work to provide correct size, shape, and location.
 6. Water Repellent: Install where shown; refer to Section 07 19 00 - WATER REPELLENTS.
- C. CLEANING
1. General: Remove mortar droppings while still fresh. Dry brush exposed masonry at the end of each day's work and after final pointing to remove mortar spots; use cleaning solution as required to provide a uniformly clean surface.
 2. Walls: At completion of work, thoroughly saturate walls with water and clean with high pressure water. Remove unused materials and debris, including scaffolds and implements when complete.

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CONCRETE UNIT MASONRY

Section 04 22 00

1. GENERAL:

- A. SUMMARY: Provide Concrete Unit Masonry, as shown and specified per Contract Documents.
- B. REFERENCES:
- American Concrete Institute (ACI):
 - ACI 530/530.1: Building Code and Specification for Masonry Structures.
 - ACI SP-66: Detailing Manual.
 - American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - International Codes Council (ICC): ICC Evaluation Service Inc. ICC-ES - SAVE Evaluation Guideline for Determining of Recycled Content of Materials (EG101).
 - National Concrete Masonry Association (NCMA): TEK Bulletin No. 28.
 - Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
- General: Submit product data, test reports, and mill certificates.
 - Shop Drawings: Submit manufacture and installation details for reinforcing per ACI, including fastenings, for review prior to fabrication of work. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties, and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.
 - Samples:
 - General: Submit the following listed samples for review prior to fabrication of work.
 - Masonry Units: One of each type, texture and color.
 - Color Mortar: Full range of samples.
 - Laboratory Samples: Masonry units, cement, mortar and aggregates for tests as called for in this Section.
 - Closeout: Submit maintenance data.
- D. QUALITY ASSURANCE:
- Testing:
 - General: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - Retesting: Agency selected and paid for by the City; retesting paid for by Contractor.
 - Masonry Testing:
 - General: Comply with CBC Chapter 21.
 - Concrete Masonry Units: Test each type, class, and grade of concrete masonry unit per UBC Standard No. 21-4.
 - Mortar Tests: Each type per UBC Standard No. 21-15.
 - Grout Tests: Each type per UBC Standard 21-18.
 - Fire Performance Characteristics: Provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119.
 - Single-source Responsibility:
 - General: Obtain masonry materials from one manufacturer for each different product required.
 - Masonry Units: Uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, for each continuous surface or visually related surfaces.
 - Mortar Materials: Ingredients of uniform quality, including color for exposed masonry, for each cementitious component and from one source and producer for each aggregate.

2. PRODUCTS:

- A. MANUFACTURE:
- General: Precision Block manufactured by RCP Block and Brick, Inc., or accepted equal.
 - Concrete Masonry Units:
 - General: Hollow load-bearing block units (CMU); ASTM C90, Grade N, Type I - Moisture Controlled, normal weight.
 - Recycled Content: Use materials with recycled content of at least 20% complying with ICC-ES - SAVE: EG101.
 - Size: Manufacturer's standard units with nominal face dimensions of 16 inches long x 8 inches (15-5/8 inches x 7-5/8 inches actual), unless otherwise indicated; thickness as shown.
 - Special Shapes: Provide special units for 90 degree corners, lintels and bond beams. Where required, provide special shapes for jambs, sash, control joints, headers and other special conditions.
 - Color: As selected by the Architect.
 - Mortar and Grout:

- a. General: Refer to Section 04 05 00 - COMMON WORK RESULTS FOR MASONRY.
 - b. Water-Repellent: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
 - c. Mortar Color: Mineral oxide pigment; color as selected by the Architect.
 4. Masonry Reinforcing:
 - a. Reinforcement Bars: Refer to Section 03 20 00 - CONCRETE REINFORCING.
 - b. Concrete Inserts: See Section 03 30 00 - CAST-IN-PLACE CONCRETE. Advise concrete installer of specific requirements regarding his placement of inserts which are to be used by the masonry installer for anchoring of masonry work.
 5. Lintels: As shown; refer to Section 05 12 00 - STRUCTURAL STEEL FRAMING.
 6. Miscellaneous Masonry Accessories:
 - a. Nonmetallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D1056, Grade RE41E1; width and thickness as shown.
 - b. Premolded Control Joint Strips: Styrene-butadiene rubber compound complying with ASTM D2000, Designation 2AA-805, designed to fit standard sash block and to maintain lateral stability in masonry wall.
 - c. Bond Breaker Strips: 15 lb. asphalt roofing felt per ASTM D226, Type I.
 7. Cleaning Solution: Non-acidic; not harmful to masonry work or adjacent materials.
 8. Water Repellent: Refer to Section 07 19 00 - WATER REPELLENTS.
- B. MIXES:
1. Mortar and Grout: Refer to Section 04 05 00 - COMMON WORK RESULTS FOR MASONRY.
 2. Partial Sack Batches: Not permitted.

3. EXECUTION:

- A. PREPARATION:
1. Environmental Requirements:
 - a. Cold Weather: Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and for 48 hours after completion of masonry work.
 - b. Hot Weather: Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and for 48 hours after completion of masonry work.
 2. Examination:
 - a. General: Examine conditions of work in place before beginning work; report defects.
 - b. Inserts: Verify that anchors, inserts, etc., placed under other Sections have been properly installed.
 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 4. Storage:
 - a. General: Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. Pile masonry units on plant platforms in dry location. Protect masonry units during freezing weather with tarpaulins or other suitable material.
 - b. Moisture Absorption of Concrete Masonry Units: Limit during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity available through the National Weather Service, San Diego Forecast Office.
 5. Protection:
 - a. General: Protect masonry surfaces not being worked on during construction. When rain is imminent and work is discontinued, cover tops of masonry walls exposed to weather with a well-secured waterproof membrane.
 - b. Stains: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove grout, mortar, or soil immediately on contact with masonry. Protect base of walls from rain-splashed mud and mortar splatter with coverings on ground and over wall surface.
 - c. Loading:
 1. General: Do not apply uniform floor or roof loading for at least 48 hours after construction of masonry walls or columns.
 2. Concentrated Loads: Do not apply concentrated loads for at least four (4) days after construction of masonry walls or columns.
 6. Surface Preparation: Clean surfaces to be in contact with mortar or grout free of deleterious materials.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Establish lines, levels, and coursing indicated. Protect from displacement. Maintain masonry courses to uniform dimension.

2. Temporary Formwork:
 - a. General: Provide formwork and shores as required for temporary support of masonry elements. Design, erect, support, brace, and maintain as required.
 - b. Construction: Conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie and support as required to maintain position and shape during construction and curing of masonry.
 - c. Form Removal:
 1. General: Do not remove forms and shores until reinforced masonry member has hardened sufficiently to carry its own weight and all other reasonable temporary loads that may be placed on it during construction.
 2. Removal Time: Seven (7) days, minimum.
3. Placing and Bonding:
 - a. General: Lay hollow masonry units with face shell bedding on head and bed joints. Buttering corners of joints or furrowing of mortar joints is not permitted. Remove excess mortar as Work progresses. Interlock intersections and external corners. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
 - b. Cutting Masonry Units: Use dry cutting motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Wherever possible use full-size units without cutting.
 - c. Wetting: DO NOT WET CONCRETE MASONRY UNITS.
 - d. Bond: Running.
 - e. Mortar Joints: Concave; form vertical and horizontal joints of uniform thickness. Install mortar per ASTM C270. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure seven (7) days before placing grout. Remove excess mortar from grout spaces.
4. Reinforcement and Anchorage:
 - a. General: Clean reinforcement of all rust, mill scale, earth, ice or other materials that will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not specifically shown or required for installation.
 - b. Placement: Position reinforcement accurately, as shown, before grouting; support and secure vertical bars against displacement. Lap reinforcement ends minimum 40 bar diameters. Maintain position within 1/2 inch of dimensioned position. Provide a clear distance between masonry unit surfaces and reinforcing of not less than one bar diameter.
 - c. Vertical Reinforcement: Place before laying masonry units. Tie vertical reinforcement to matching dowels at base of masonry and thread masonry units over or around reinforcement. Support vertical reinforcement at 10'-0" intervals, maximum. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1 inch (whichever is greater). For columns, piers and pilasters, provide a clear distance between vertical bars as shown, but not less than 1-1/2 times the nominal bar diameter or 1-1/2 inches, whichever is greater. Provide lateral ties as shown.
 - d. Horizontal Reinforcement: Place as the masonry units are laid in bond beam units. Depth of bond beam channel below the top of the unit shall be a minimum of 1-1/2 inches, with a minimum width of 3 inches.
5. Lintels: As shown; do not splice reinforcing bars. Allow masonry lintels to attain specified strength before removing temporary supports.
6. Built-in Work:
 - a. General: As work progresses, install built-in and other items to be installed in the work and furnished by other Sections. Install items plumb and level.
 - b. Fabricated Metal Frames: Bed anchors in adjacent mortar joints; fill frame voids solid with grout. Fill adjacent masonry cores with grout.
7. Control and Expansion Joints:
 - a. General: Provide vertical expansion, control, and isolation joints, as shown.
 - b. Sealants and Joint Fillers: Refer to Section 07 92 10 - JOINT SEALERS.
8. Grouting:
 - a. General: Install grout per CBC Section 2104.6. Work grout into masonry cores and cavities to eliminate voids. Do not displace reinforcement while placing grout.
 - b. Low Lift Grouting: Place first lift of grout to a height of 16 inches and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.
 - c. High Lift Grouting:
 1. Cleanouts: Provide opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit. Clean out masonry cells and cavities of loose material and mortar droppings. Permit complete water drainage.

2. Double Wythe Walls: Omit every second masonry unit in one of the wythes for clean out and cell inspection purposes. Construct vertical grout barriers or dams between the masonry wythes, with masonry units every 30'-0" maximum.
 3. Grouting: Pump grout into spaces; maintain water content in grout to intended slump without aggregate segregation. Limit grout lift to 60 inches and rod for grout consolidation.
 - d. Embedded Items: Place in masonry as necessary for work of other trades. Grout solidly in place with not less than 1 inch of grout surrounding inserts.
 - e. Curing: Maintain masonry continuously moist for at least 3 days after laying.
 9. Masonry Flashings: Per Section 07 60 00 - FLASHING AND SHEET METAL.
 10. Construction Tolerances:
 - a. General: Per Section 01 43 00 - QUALITY ASSURANCE. Install to allow application of subsequent finish materials within specified tolerances.
 - b. Variation From Alignment of Columns: 1/4 inch, maximum.
 - c. Variation From Unit to Adjacent Unit: 1/32 inch, maximum.
 - d. Variation from Plane of Wall: Maximum of 1/4 inch in 10'-0" and 1/2 inch in 20'-0" or more.
 - e. Variation from Plumb: Maximum of 1/4 inch per story non-cumulative; 1/2 inch in two (2) stories or more.
 - f. Variation from Level Coursing: Maximum of 1/8 inch in 3'-0" and 1/4 inch in 10'-0"; 1/2 inch in 30'-0".
 - g. Variation of Joint Thickness: 1/16 inch in 3'-0", maximum.
 11. Repairing and Pointing:
 - a. General: Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
 - b. Pointing: During the tooling of joints, enlarge voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance.
- C. FIELD QUALITY CONTROL:
1. Inspection: Continuous inspection of grouted masonry will be approved by the Architect for inspection of that work.
 2. Field Testing:
 - a. Mortar and Grout:
 1. General: Tested for compression per CBC 2105.3.3.
 2. Samples: At beginning of masonry work, at least one (1) test sample of mortar and grout shall be taken on three (3) successive working days, and at one (1) week intervals thereafter. Mortar samples shall be made in 2 inch x 4 inch cylinders. Additional samples will be taken for each day's work.
 3. Grout Prisms: Provide 4 inch x 4 inch x 8 inch, made with masonry molds; break molds away after grout has set, but before it has hardened. Test specimens in vertical position, at age of seven (7) days and at age of twenty-eight (28) days.
 - b. Test Cores: Take a minimum of two (2) cores, and an additional two (2) cores for each additional 5,000 square feet of grouted masonry walls, at points selected by Architect in compliance with CBC 2105A.3.1. City will pay for coring and testing of walls, but Contractor will repair walls cored at no extra cost. In event more than two (2) cores are required to be taken to establish acceptability of work as result of low or questionable tests or suspected faulty workmanship, costs of coring in excess of two (2) cores will be paid by City and backcharged to Contractor.
 3. Retesting: Make necessary corrections to non-conforming Work; retest at Contractor's expense.
- D. CLEANING AND SEALING:
1. Cleaning:
 - a. General: Remove mortar droppings while still fresh. Dry brush exposed masonry at the end of each day's work and after final pointing to remove mortar spots; use cleaning solution as required to provide a uniformly clean surface per NCMA TEK Bulletin No. 28.
 - b. Walls: At completion of work, thoroughly saturate walls with water and clean with high pressure water.
 2. Water Sealing:
 - a. General: Provide water sealing after installation of joint sealant specified in Section 07 92 10 - JOINT SEALERS.
 - b. Surface Preparation: Surface must be clean, dry and free of efflorescence, dust and mortar. Cure for ten (10) days minimum, prior to application. Apply under dry weather conditions; mask adjacent areas to protect from overspray.
 - c. Water Repellent: Apply where shown; refer to Section 07 19 00 - WATER REPELLENTS.

GLASS UNIT FLOOR MASONRY

Section 04 23 16

1. GENERAL:

- A. SUMMARY: Provide Glass Unit Floor Masonry, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): The Surface Treatment and Finishing of Aluminum and its Alloys.
 - 2. Aluminum Anodizers Council (AAC): Finishing standards.
 - 3. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM B221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 - c. ASTM D2000: Standard Classification System for Rubber Products in Automotive Applications
 - 4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Samples: Full range of color samples.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of five (5) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory.
 - b. Recycled Metal Content: Use materials with recycled content of at least 20%.
 - 2. Glass Unit Floor Masonry:
 - a. General: Glaswalk Floor System manufactured by the Innovative Building Products, Inc.
 - b. Alternate Manufacturers: No known equal.
 - c. Glass Pavers:
 - 1. Type: Obscure glass, non-slip, traction control, ceramic frit Concentric Circle Pattern.
 - 2. Size: 8 inch x 8 inch.
 - d. Supporting Grid:
 - 1. General: Manufacturers standard ASTM B221 extruded aluminum perimeter frame and grid sized to fit glass pavers; unit size as shown.
 - 2. Paver Boots: Molded ASTM D2000 EPDM sleeve and setting accessories.
 - 3. Finish: Anodized; color selected by the Architect.
 - e. Cushions: Manufacturers standard extruded silicone.
 - f. Accessories: As recommended by manufacturer for condition of installation shown.
 - g. Fasteners: As recommended by manufacturer.
 - 3. Sealant: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Supporting Frame: Set top surface of grid and pavers flush with adjoining floor surfaces.
 - 3. Glass Pavers: Insert units into paver boots and set in grid modules.
 - 4. Sealant: Apply as recommended by manufacturer.

* End Division 04 *

Division 05 - METALS

COMMON WORK RESULTS FOR METALS Section 05 05 00

1. GENERAL:

- A. SUMMARY: Provide Common Work Results for Metals, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM F2329: Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
 - 2. American Welding Society (AWS):
 - a. AWS A2.1: Structural Welding Symbols.
 - b. AWS D1.1: Structural Welding Code - Steel.
 - c. AWS D1.3: Structural Welding Code - Sheet Steel.
 - 3. Steel Structures Painting Council (SSPC):
 - a. General: Painting Manual.
 - b. SSPC-Paint 15: Steel Joist Shop Primer.
 - c. SSPC-Paint 23: Latex Primer for Steel Surfaces.
 - d. SSPC-Paint 25: Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings, and test reports.
 - 2. Certificates:
 - a. Welders: Certify that welders employed on the Work have met AWS qualifications within the past twelve (12) months.
 - b. High Strength Bolts: Two (2) certified copies of inspection test reports for each production lot indicating proof load, tensile strength (wedge test), and hardness.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.
 - 2. Source Quality Control:
 - a. General: Material delivered with certificates classified as "identifiable"; without certificates classified as "unidentifiable".
 - b. Testing of "Unidentifiable" Material:
 - 1. General: Tests by testing agency; paid for by Contractor. Test material not identifiable by heat number and mill test or other acceptable manufacturer's identifications per ASTM A370 as follows.
 - 2. High Strength Bolts: Each lot of 100 bolts; tensile tests on 2 bolts in full size and one tensile test on a 1/2-inch diameter machined specimen.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Bolts, Nuts and Washers:
 - a. General: Comply with ASTM F2329 where connector may be exposed to moisture.
 - b. Machine Bolts and Nuts: ASTM A307, Grade A, including Supplementary Requirement S1; nuts per ASTM A563.
 - c. High Strength Steel Bolts and Nuts: ASTM A325, Type 1, bearing bolts, washers and nuts.
 - d. Anchor Bolts: ASTM A307, Grade A or C, including Supplementary Requirement S1; nuts per ASTM A563.
 - e. Washers: ASTM F436; compressible washer type direct tension indicators, ASTM F959.
 - f. Lock-washers: ANSI B27.1; helical spring type, carbon steel; medium series.
 - 2. Welding:
 - a. General: Per AWS D1.1.
 - b. Sheet Steel: AWS D1.3.

3. Primer:
 - a. General: Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664. Comply with the requirements of Section 09 91 00 - PAINTING for surfaces to receive subsequent coats of paint.
 - b. Shop Primer: SSPC-Paint 15; VOC compliant.
 - c. Latex Primer: SSPC-Paint 23; VOC compliant.
 - d. Zinc Oxide, Alkyd, Linseed Oil Primer: SSPC-Paint 25; VOC compliant.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects.
2. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Placement: Refer to Sections 05 12 00 - STRUCTURAL STEEL FRAMING, 05 31 00 - STEEL DECKING, 05 41 10 - METAL STUD FRAMING and 05 50 00 - METAL FABRICATIONS.

* * *

STRUCTURAL STEEL FRAMING

Section 05 12 00

1. GENERAL:

A. SUMMARY: Provide Structural Steel Framing, as shown and specified per Contract Documents.

B. REFERENCES:

1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM A6: Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
2. American Institute of Steel Construction (AISC):
 - a. AISC Design Guide No. 10: Erection Bracing of Low-Rise Structural Steel Frames.
 - b. AISC 303: Code of Standard Practice for Steel Buildings and Bridges.
 - c. AISC 325: Steel Construction Manual.
 - d. AISC 327: Seismic Design Manual.
 - e. AISC 360: Specification for Structural Steel Buildings.
 - f. Exposed Steel: Guide Specification for Architecturally Exposed Structural Steel.
3. American Welding Society (AWS):
 - a. AWS D1.1: Structural Welding Code - Steel.
 - b. AWS D1.3: Structural Welding Code - Sheet Steel.
4. Steel Structures Painting Council (SSPC):
 - a. SSPC-SP 1: Solvent Cleaning.
 - b. SSPC-SP 2: Hand Tool Cleaning.
 - c. SSPC-SP 3: Power Tool Cleaning.
 - d. SSPC-SP 6: Commercial Blast Cleaning.
 - e. SSPC-PA 2: Measurement of Dry Coating Thickness with Magnetic Gages.
5. Research Council on Structural Connections (RCSC): Specifications for Structural Joints Using A325 or A490 Bolts.

C. SUBMITTALS:

1. General: Submit product data and samples.
2. Shop Drawings:
 - a. General: Submit complete fabrication and erection drawings; identify architecturally exposed structural steel as required by AISC.
 - b. Erection and Welding Sequence: Submit written procedure of each miter and welding sequence at each joint to minimize effect of weld shrinkage residual stress, and to maintain erection tolerances.
 - c. Welding Electrodes: Identify each type and class.
3. Test Reports: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
4. Certificates:
 - a. Welders: Certify that welders employed on the Work have met AWS qualifications within the past twelve (12) months.
 - b. Welded Studs: Two (2) certified copies of in-plant quality control mechanical tests.
 - c. Structural Steel: Two (2) certified copies of mill test reports indicating physical and chemical properties of steel used. Correlate individual heat numbers with each specified section and location.
 - d. High Strength Bolts: Two (2) certified copies of inspection test reports for each production lot indicating proof load, tensile strength (wedge test), and hardness.

D. QUALITY ASSURANCE:

1. Qualifications:
 - a. General: Fabricator and installer specializing in the work of this Section with minimum three (3) years documented experience.
 - b. Welding: Performed by certified welders per AWS.
2. Testing:
 - a. General: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - b. Retesting: Agency selected and paid for by the City; retesting paid for by Contractor.
3. Source Quality Control:
 - a. General: Material delivered with certificates classified as "identifiable"; without certificates classified as "unidentifiable".
 - b. Testing of "Unidentifiable" Material:
 1. General: Tests by testing agency; paid for by Contractor. Test material not identifiable by heat number and mill test or other acceptable manufacturer's identifications per ASTM A370 as follows.
 2. Structural Shapes and Plates: From coupons taken from material; one tensile test and one bend test per 5 tons of each shape.

3. High Strength Bolts: Each lot of 100 bolts; tensile tests on 2 bolts in full size and one tensile test on a 1/2 inch diameter machined specimen.
4. Welded Studs: Each lot of 100 studs; tensile test on 3 finished studs.
5. Other Materials: Test as directed.

2. PRODUCTS:

A. MATERIALS:

1. Structural Steel:
 - a. General: ASTM A36, unless otherwise shown.
 - b. W - Shapes: ASTM A992, Grade 50.
 - c. Steel Tubing (Rectangular and Square Hollow Structural Sections [HSS]): ASTM A500, Grade B.
 - d. Steel Pipe (Round Hollow Structural Sections [HSS]): ASTM A53, Type E or S, Grade B.
 - e. Dimensional Standards: Per AISC and ASTM A6; welded shapes per dimensional standards of mill rolled sections.
 - f. Quality: Sound, free from loose mill scale, cracks, laminations, and slag inclusions.
2. Connectors:
 - a. General: Refer to Section 05 05 00 - COMMON WORK RESULTS FOR METALS.
 - b. Welded Studs: ASTM A108, AWS D1.1, shear connector type, styles, and sizes shown; headed with welding end fluxed for automatic welding.
3. Welding Electrodes: AWS; applicable types and classes.
4. Primer: Refer to Section 05 05 00 - COMMON WORK RESULTS FOR METALS.
5. Non-shrink Grout: Refer to Section 03 30 00 - CAST-IN-PLACE CONCRETE.

B. FABRICATION:

1. General: Fabricate per AISC specifications. Mark and match-mark shop assembled material.
2. Exposed Structural Steel: Comply with AISC Architecturally Exposed Structural Steel fabrication requirements. Galvanize exterior exposed steel.
3. Planing and Milling: Mill bearing surfaces to true planes.
4. Holes, Cutouts, and Fittings: Provide where shown for other trades. No additional holes, cutouts, or fittings permitted without written permission.
5. Camber: Fabricate beams and girders with natural camber upward, unless otherwise shown.
6. Welding: Procedures and qualified welders per AWS. Assemble built-up sections by welding; free of warps; axes straight within specified tolerances. Automatic or semi-automatic welding may be used per AWS procedure.
7. Welded Studs: Per AWS procedure. Clean areas to receive studs; remove mill scale, rust, oil, grease, and other foreign material which may inhibit fusion. Preheating not required if fusion tests meet AWS requirements. Provide one extra test stud per 50 bolts welded.
8. Exposed Tube Ends: Cap and finish with similar material.
9. Shop Painting:
 - a. General: Do not shop paint surfaces and edges of field welded steel; keep paint at least 2 inches away from welds. Allow paint to dry before handling or shipment of structural steel.
 - b. Surface Preparation:
 1. General: Clean surfaces of loose mill scale, dirt, rust, and other foreign matter by use of suitable tools; hand tool cleaning per SSPC-SP 2 and power tool cleaning per SSPC-SP 3. Remove oil and grease with volatile solvents per SSPC-SP 1.
 2. Machine Finished Surfaces: Carefully protect against corrosion with a coat of white lead and tallow or similar protection; apply per AISC requirements prior to shipment.
 3. Unpainted Surfaces: Remove oil and grease with solvent cleaners; remove dirt and other foreign material by sweeping with wire brushes.
 - c. Application: Per SSPC Standards; apply paint when temperature is above 40 degrees F, in dry weather or under cover, by brush or spray over dry dust-free surfaces to a dry film thickness not less than 2.0 mils.
10. Fabrication Inspection:
 - a. General: Perform welding under supervision of Testing Laboratory; furnish Architect with verified report that welding is adequate and conforms with drawings and specified requirements. Testing Laboratory may use non-destructive or visual inspection to verify the adequacy of welding.
 - b. Structural Steel:
 1. General: Visually inspect for defects such as laminations and non-metallic inclusions. Determine extent of laminations ultrasonically.
 2. Acceptable Defects: Maximum dimension 10 inches; maximum area 40 square inches.
 3. Repairs: Remove defects, reweld, and grind welds flush; use method of repairs acceptable to testing agency.
 - c. Welds:
 1. General: Supplement visual inspection with non-destructive tests as required.
 2. Ultrasonic Testing: Maintain record of welds examined, defects found, and disposition.

- of defects. Retest repaired defective welds ultrasonically.
3. Testing Rate: Test welds ultrasonically at rate of 100 percent to establish qualification of each welder. If defects occur in less than 5 percent of welds tested, reduce testing rate to 25 percent. Calculate percentage for each welder.
 4. Defects: When ultrasonic indications arising from weld root can be interpreted as a weld defect or backing strip reflection, remove backing strip. If no root defect is visible, retest weld. If retest shows no defect, and no significant amount of base and weld metal has been removed, weld is acceptable. Do not count questionable root indications that prove not to be defects against welder to increase test rate.
- d. Welded Studs: Inspect per AWS D1.1.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Base erection upon use of metal decking as a safety and construction floor in areas shown to receive metal decking. In other areas, safety planking provided under this section.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Measurements: Take field measurements; report variance between plan and field dimensions.
4. Delivery:
 - a. General: Deliver structural steel to job site per ASTM A6. Clearly identify applicable types of steel.
 - b. Storage: Minimum amounts of materials may be stored at site; place to prevent damage to members. Protect against corrosion, deterioration, and soiling from construction operations. Materials damaged due to improper storage will be rejected.
5. Surface Preparation: Scribe column center lines on foundations.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Allow for erection loads, and design and provide sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing. Do not field cut or alter structural members without approval of Architect.
2. Exposed Structural Steel: Comply with AISC Architecturally Exposed Structural Steel installation requirements.
3. Drifting: Light drifting permitted to draw holes together; drifting of unfair holes not permitted. Where enlarged holes are acceptable, use twist drills to enlarge holes to make connections. Members weakened by reaming because of over-sized holes, or impossible to adjust accurately after reaming, not permitted.
4. Flame-cutting: Only by written permission. Use of burned holes for bolted connections not permitted; structural members with burned holes will be rejected.
5. Erection Tolerances:
 - a. General: Per AISC Code of Standard Practice and to allow for tolerances required in the subsequent installation of finish materials per Section 01 43 00 - QUALITY ASSURANCE.
 - b. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
 - c. Maximum Offset From True Alignment: 1/4 inch.
6. Connectors:
 - a. General: Do not weld or draw bolts tight until structure is properly aligned.
 - b. Bolting:
 1. General: Field connect members with threaded fasteners; torque to required resistance. Use 3/4 inch diameter bolts, unless otherwise shown; fit each bolt with a lock washer under nut.
 2. High Strength Bolts:
 - a) General: Install per referenced standard for high strength bolting. Use turn-of-nut method for tightening.
 - b) Alignment: Fair up holes with drift pins to bring adjacent parts into proper alignment.
 - c) Installation: Place bolts in open holes; bring bolts to snug tight condition with adjacent surfaces of joining parts in full contact. Replace pinned holes with bolts and draw tight. No bolt threads permitted in facing surfaces.
 - d) Tightening: Sequentially tighten bolts to proofload. Recheck bolts in joint after first pass of tightening to assure initial bolts did not loosen during tightening of subsequent bolts.
 - e) Identification: Mark completed joint with identifying symbol.
7. Welding: Per AWS; preheat where required.
8. Grouting: Grout under base plates as shown; trowel surface smooth, splay neatly to 45 degrees.
9. Holes for Mechanical and Electrical Work:
 - a. General: Refer to Divisions 21 - FIRE SUPPRESSION, 22 - PLUMBING, 23 - HEATING, VENTILATING AND AIR CONDITIONING, 26 - ELECTRICAL and 27 - COMMUNICATIONS.

Fire Station No. 2 (Bay) and Reinforcement: Coordinate location and cutting of holes required for piping and

conduit prior to, or during installation of structural elements. Subsequent cutting and reinforcement is the responsibility of the requisite trade.

- c. Anchorage and Support Requirements: Coordinate as required by the requisite trade.
10. Ceiling Grid System: Install as shown, including attachments to walls and overhead structure. Make connections with standard Unistrut fittings and 1/2 inch diameter bolts, unless otherwise shown.
11. Primed Surfaces: Touch-up marred and abraded surfaces; paint field connections and adjacent uncoated portions of structural steel.
- C. FIELD QUALITY CONTROL:
 1. General: By testing agency and as specified for fabrication inspection.
 2. Erection Inspection:
 - a. Field Welds: Test as specified for fabrication inspection.
 - b. High Strength Bolting: Sample test approximately 10 percent of bolts after tightening; use accurately calibrated manual torque wrenches.
 3. Retesting: Make necessary corrections to work that is not in conformance with specified requirements and retest at Contractor's expense.

* * *

STEEL DECKING

Section 05 31 00

1. GENERAL:

- A. SUMMARY: Provide Steel Decking, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American Iron and Steel Institute (AISI): AISC 325: Steel Construction Manual.
 - 3. American Welding Society (AWS):
 - a. AWS D1.1: Structural Welding Code - Steel.
 - b. AWS D1.3: Structural Welding Code - Sheet Steel.
 - 4. Steel Deck Institute (SDI): Design Manual for Composite Decks, Form Decks and Roof Decks.
 - 5. Steel Structures Painting Council (SSPC): SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
 - 6. Underwriters' Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Steel Decking:
 - a. General: Steel decking manufactured by the ASC Steel Deck Division, ASC Profiles, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the Vulcraft Division of the Nucor Corp., or accepted equal.
 - c. Sheet Steel: ASTM A653, Grade B Structural Quality; with G60 galvanized coating.
 - 2. Bearing Plates: ASTM A36 steel, unfinished.
 - 3. Stud Shear Connectors: ASTM A108 steel, Grade 1015, forged steel, headed, uncoated.
 - 4. Welding Materials: AWS D1.1 and AWS D1.3.
 - 5. Primer: SSPC - P25, Primer Coating, alkyd, corrosion-inhibiting, lead- and chromate-free, VOC-compliant.
 - 6. Fasteners: Galvanized hardened steel, steel-tapping; refer to Section 05 05 00 - COMMON WORK RESULTS FOR METALS.
 - 7. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
 - 8. Accessories:
 - a. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the decking.
 - b. Acoustical Insulation: Glass fiber type, minimum 1.1 pounds per cubic foot density; profiled to suit decking.
- B. FABRICATION:
 - 1. Metal Decking:
 - a. Span Design: Double.
 - b. Minimum Metal Thickness: Excluding finish, 22 gage sheet steel, unless otherwise noted.
 - c. Nominal Height: 1-1/2 inch, unless otherwise noted; fluted profile to SDI NR.
 - d. Formed Sheet Width: 24 inch, minimum.
 - e. Side Joints: Lapped.
 - f. Flute Sides: Plain vertical face.
 - 2. Accessories: Metal closure strips, cover plates, and related accessories, 22 gage galvanized sheet steel; of profile and size as shown.
 - 3. Cant Strips: Formed sheet steel, 45 degree slope, 3-1/2 inch nominal width and height, flange for attachment, gage as shown.
 - 4. Primer: Per SSPC-Paint 15.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Storage: Cut plastic wrap to encourage ventilation. Store decking on dry wood sleepers; slope for positive drainage.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

2. Erection: Bear decking on support surfaces with bearing as shown. Align and level.
3. Welding: Per AWS D1.1 and AWS D1.3; weld male/female side laps at 18 inches on center maximum.
4. Openings: Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4 inch steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and attach to deck at each flute.
5. Metal Cant Strips: Place in position and attach as shown.
6. Stud Shear Connectors: Weld through steel deck to structural members below.
7. Holes for Mechanical and Electrical Work:
 - a. General: Refer to Divisions 21 - FIRE SUPPRESSION, 22 - PLUMBING, 23 - HEATING, VENTILATING AND AIR CONDITIONING, 26 - ELECTRICAL and 27 - COMMUNICATIONS.
 - b. Cutting and Reinforcement: Coordinate location and cutting of holes required for piping, ductwork and conduit prior to, or during installation of steel decking. Subsequent cutting and reinforcement is the responsibility of the requisite trade.
 - c. Anchorage and Support Requirements: Coordinate as required by the requisite trade.
8. Touch-up: Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with primer.

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METAL STUD FRAMING

Section 05 41 10

1. GENERAL:

- A. SUMMARY: Provide Metal Stud Framing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American National Standards Institute (ANSI): Standard No. A97.2.
 - 3. Intertek Testing Services (ITS): Fire resistance standards.
 - 4. Steel Stud Manufacturers Association (SSMA): Product Technical Information.
 - 5. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Metal Stud System:
 - a. General: Manufactured by Dietrich Metal Framing, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the Gold Bond Building Products Division of the National Gypsum Co., or accepted equal.
 - 2. Stud Types:
 - a. General: Provide types designed for screw application of gypsum wallboard.
 - b. Metal Studs: ASTM C645, non-load bearing type with punched webs; roll-formed electro-galvanized steel sheet; 25 gage, unless otherwise shown.
 - c. Structural Studs:
 - 1. General: Roll-formed load-bearing type with wide flanges and punched webs; 16 gage, unless otherwise shown.
 - 2. Steel Sheet: ASTM A792; 50,000 psi minimum yield point for 16 gage and heavier; 33,000 psi for 18 gage and lighter; galvanized where shown.
 - 3. Configuration: Channel type, Cee type where shown.
 - 4. Finish: VOC compliant red oxide paint.
 - 3. Channels:
 - a. Furring: 25 gage electro-galvanized steel sheet, roll-formed, 2-3/4 inch x 7/8 inch deep with 1/2 inch wide flanges.
 - b. Runners: 1/2 inch cold rolled steel weighing not less than 475 lbs. per 1000 lineal feet; rust-inhibitive coated.
 - c. Stiffeners: 3/4 inch cold rolled steel weighing not less than 300 lbs. per 1000 lineal feet; rust-inhibitive coated.
 - 4. Fasteners:
 - a. General: Refer to Section 05 05 00 - COMMON WORK RESULTS FOR METALS.
 - b. Expansion Bolts: FS FF-S-325, Group III, expansion shield (self-drilling tubular expansion shell anchor bolts); Type 1 or 2, unless otherwise shown.
 - c. Powder Driven Fasteners:
 - 1. General: X-ZF fasteners manufactured by Hilti, Inc.; size as shown.
 - 2. Alternate Manufacturers: Comparable products with current ICC approval and equal or greater rated load capacity, manufactured by the US Anchor Corp., or accepted equal.
 - d. Screws: Type S bugle head; sizes recommended by gypsum board manufacturer.
 - 5. Wire Hangers: 8 gage galvanized soft steel wire.
 - 6. Neoprene Tape: ASTM D1056, Grade SCE41, soft sponge neoprene with adhesive one side; black; 1/4 inch x 1/2 inch, unless otherwise shown.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements: Where partitions and sprayed fireproofing are scheduled in same area, install clips for attachment of metal framing before application of sprayed-on fireproofing.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

2. Metal Framing:
 - a. General: ANSI A97.2.
 - b. Structural Studs: MLSFA.
3. Assemblies:
 - a. Fire Rated: Per UL and code requirements. Use one manufacturer for each assembly, unless otherwise permitted by governing authorities.
 - b. Sound Controlled: Use one manufacturer for each assembly, unless otherwise permitted by manufacturer.
4. Metal Stud Partitions:
 - a. General: Install complete with matching runner tracks and accessories. Align runner tracks accurately to partition layouts.
 - b. Floor Runners: Secure with 1/4 inch diameter expansion bolts or powder driven fasteners at least 1 inch long, where permitted by code. Space fasteners 4 inches from ends of each piece; maximum 24 inches on center intermediately; minimum of 2 fasteners per piece of runner.
 - c. Ceiling Runners:
 1. General: Install to heights and levels, or to structure above as shown.
 2. To Concrete: Fasten as specified for floor runners.
 3. To Metal Decking:
 - a) General: Fasten with powder driven fasteners as specified for floor runners.
 - b) Areas With Sprayed-On Fireproofing: Provide 20 gage galvanized steel Z-shaped clips, unless otherwise shown, or other acceptable shapes. Fabricate of depth to accommodate sprayed-on fireproofing thickness; space not over 24 inches on center. Secure into place by welding or powder driven fasteners as specified for floor runners. Attach runners to clips with sheet metal screws; one screw per clip.
 4. To Structural Steel: As specified for metal decking; secure with welds or other appropriate means in lieu of powder driven fasteners.
 - d. Studs: Gages, depths, and spacing shown. Where not shown, provide per stud manufacturer's recommendations.
 - e. Stiffeners: 2 rows at third points for studs with finish one side only; one row at midpoint for studs with finish both sides. Snap into punched web of each stud; nest laps and wire tie.
 - f. Chase Wall Partitions: Cross brace at quarter points with 5/8 inch thick gypsum wallboard; braces 12 inches by width of partition. Fasten to studs with 3 fasteners per edge.
5. Structural Stud Partitions:
 - a. General: Install complete with matching runner tracks and accessories. Align runner tracks accurately to partition layouts.
 - b. Anchor Bolts:
 1. General: Install 1/2 inch diameter hook anchors not more than 48 inches on center; minimum of 2 bolts per piece of track; locate one bolt within 12 inches of each end. Use 8 inch long bolts; embed into concrete at least 7 inches, unless otherwise shown.
 2. Contractor's Option: Expansion bolts or powder driven fasteners of acceptable types and sizes may be used in lieu of anchor bolts, where permitted by code.
 - c. Runner Tracks: Fasten floor track with appropriate anchors; fasten top track as shown. Butt weld track or splice with channel inserts fastened with 2 sheet metal screws, bolts, or rivets at each corner.
 - d. Studs: Gages, depths, and spacing shown. Where not shown, provide per stud manufacturer's recommendation. Install plumb, square, and straight; weld flanges to track. Provide openings with top and bottom headers and jack studs over openings; weld connections.
 - e. Bridging: Per manufacturer's recommendations.
6. Furred Partitions:
 - a. General: Install furring channels at 24 inches on center; level and plumb with steel shims.
 - b. To Concrete: Fasten with powder driven fasteners at 24 inches on center.
 - c. To Concrete Block: As specified for concrete.
 - d. To Structural Steel: As specified for metal stud partitions.
7. Backing Plates: Install for built-in items; attach to metal studs by welds or sheet metal screws as applicable.
8. Suspended Ceilings:
 - a. General: Install for gypsum wallboard ceilings. Where ductwork or other obstructions prohibit use of specified system, provide heavier system per referenced Standard.
 - b. Hanger Wires:
 1. General: Space at 48 inches on center both ways; do not support more than 16 square feet of ceiling per wire. Locate a hanger within 6 inches of end of main runners.
 2. Metal Decking: Wires may be attached by penetrating through decking, twisted, and looped; no penetrations permitted through electrified cells. If provided as integral part of metal decking, wire may be attached through hanger slots.

3. Steel Supports: Wrap around or through steel, or attach by other acceptable methods.
- c. Runner Channels: Space not over 48 inches on center; wrap each hanger wire twice around runner channel.
- d. Furring Channels: Attach to runner channels at 16 inches on center with snap-on clips or other acceptable methods.
- e. Openings: Reinforce as required for support of mechanical and electrical fixtures.
- f. Seismic Restraint: As shown.
9. Galvanizing Repair: Repair galvanizing damaged during fabrication and installation; refer to Section 05 50 00 - METAL FABRICATIONS.
10. Tolerances:
 - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of $1/240$ of the wall height.
 - b. Interior Load-Bearing Wall Framing: Horizontal deflection of $1/240$ of the wall height.
 - c. Exterior Non-Load-Bearing Curtain-Wall Framing: Horizontal deflection of $1/240$ of the wall height.
 - d. Ceiling Joist Framing: Vertical deflection of $1/240$ of the span.

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METAL FABRICATIONS

Section 05 50 00

1. GENERAL:

- A. SUMMARY: Provide miscellaneous Metal Fabrications, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): The Surface Treatment and Finishing of Aluminum and its Alloys.
 - 2. Aluminum Anodizers Council (AAC): Finishing standards.
 - 3. American Institute of Steel Construction (AISC):
 - a. AISC ASD Manual: Manual of Steel Construction, Volume I and Volume II - Connections; based on Specification for Structural Steel Buildings--Allowable Stress Provisions.
 - b. AISC LRFD: Manual of Steel Construction.
 - c. AISC 303: Code of Standard Practice for Steel Buildings and Bridges.
 - 4. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 5. American Welding Society (AWS):
 - a. AWS A2.1: Structural Welding Symbols.
 - b. AWS D1.1: Structural Welding Code - Steel.
 - c. AWS D1.3: Structural Welding Code - Sheet Steel.
 - 6. National Association of Architectural Metal Manufacturers (NAAMM): Metal Finishes Manual for Architectural and Metal Products.
 - 7. Steel Structures Painting Council (SSPC): Painting Manual.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee.
- D. QUALITY ASSURANCE:
 - 1. General: Fabricator and installer specializing in the work of this Section with minimum three (3) years documented experience.
 - 2. Welding: Performed by certified welders per AWS.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Steel:
 - a. General: ASTM A36.
 - b. Tubing (Rectangular and Square Hollow Structural Sections [HSS]): ASTM A500, Grade B.
 - c. Pipe (Round Hollow Structural Sections [HSS]): ASTM A53, Type E or S, Grade B.
 - 2. Stainless Steel:
 - a. General: ASTM A666, Type 304; plate and sheet.
 - b. Structural Tubing: ASTM A554, Type 304.
 - c. Bars and Shapes: ASTM A276, Type 304.
 - d. Rolled Floor Plate: ASTM A793.
 - e. Finish: SSINA No. 4.
 - f. Fasteners:
 - 1. Screws: Stainless steel self tapping type.
 - 2. Bolts: ASTM F593.
 - 3. Nuts: ASTM F594.
 - 3. Fastenings:
 - a. General: Bolts, nuts, screws, washers, and other various fastenings necessary for proper erection of work; refer to Section 05 05 00 - COMMON WORK RESULTS FOR METALS. Galvanized steel fastenings or other non-rusting types for exterior steel work.
 - b. Exposed in Finished Surfaces: Tamperproof countersunk Phillips flat head screws, unless otherwise shown; finish to match adjacent surfaces.
 - c. Plastic Screw Anchors:
 - 1. General: Plastic Anchors manufactured by Hilti, Inc.
 - 2. Alternate Manufacturers: Comparable products manufactured by U.S. Anchor Corp., or accepted equal.
 - 3. Plastic: Type HUD.
 - 4. Self-drilling: Type HFP.
 - 5. Impact: Type HPS.
 - d. Drilled-in Concrete Anchors:
 - 1. General: Kwik Bolt TZ manufactured by Hilti, Inc.; stainless steel or galvanized for exterior work.
 - 2. Alternate Manufacturers: Comparable products with current ICC approval and equal or greater rated load capacity, manufactured by U.S. Anchor Corp., or accepted equal.

4. Galvanizing:
 - a. General: Hot-dip process per ASTM A123 or ASTM A153, as applicable. Minimum coating: 2 oz. per square foot.
 - b. Repair Treatment:
 1. Rod: Per ASTM A780.
 2. Coating: Per MIL-P-46105.
 5. Plastic Cement: FS SS-C-153, Type 1.
 6. Non-shrink Grout: Refer to Section 03 30 00 - CAST-IN-PLACE CONCRETE.
 7. Protective Coatings:
 - a. Backing Paint: Zinc chromate, alkyd.
 - b. Bituminous Coating: FS TT-C-494, Type II; bituminous.
 8. Primer: Refer to Section 05 05 00 - COMMON WORK RESULTS FOR METALS and Section 09 91 00 - PAINTING.
- B. FABRICATION:
1. Workmanship:
 - a. General: Shop assemble work in largest practical sections; minimize field connections. Grind smooth parts exposed to view; remove weld marks and leave free of fabrication marks. Miter corners and edges unless otherwise shown. Make members true to length so assembling may be done without fillers. Bends, twists, open joints in finished members, or projecting edges or corners at connections will not be permitted. Miter, cope, and block carefully to produce tight hairline joints. Provide lugs, clips, connections, bolts, and fastenings necessary to complete fabrication.
 - b. Exposed Steel: Comply with AISC Architecturally Exposed Structural Steel fabrication requirements.
 - c. Galvanizing: Galvanize steel in exposed exterior locations and in areas where moisture may be present at interior locations. Treat all areas burned off or damaged during fabrication with specified repair compound.
 - d. Reinforcement: Provide proper reinforcement for hardware, and other fabricated metal work, as required.
 - e. Welding: Use sequence welding to minimize distortion and heat stresses. Weld by shielded electric arc process per AWS. Use continuous welding along entire area of contact, except where spot welding is permitted. Grind all welds smooth on exposed surfaces. Spot welding not permitted on exposed surfaces.
 - f. Shop Painting and Priming of Surfaces to be Painted: Per SSPC standards.
 - g. Dissimilar Metals: Isolate with bituminous coating.
 2. Fabrications:
 - a. General: Fabricate the following items, complete as shown.
 - b. Angle Thresholds: Steel, as detailed, with welded stud anchors; galvanize after fabrication.
 - c. Countertop Supports: Fabricate from steel angles as shown.
 - d. Guardrails, Handrails and Posts:
 1. General: Standard weight steel pipe and bar stock per CBC and ADA requirements and as shown; welded, plugged and ground smooth. Weld to mounting plates where required.
 2. Handrail Brackets:
 - a) General: Model No. 275 Stainless Steel, manufactured by Julius Blum & Co., Inc.
 - b) Alternate Manufacturers: Comparable products manufactured by Blumcraft of Pittsburgh, or accepted equal.
 - c) Galvanized: Model No. 1386 Galvanized, where show.
 - e. Stainless Steel Cable Assembly:
 1. General: Webnet No. 20256-0150-060 manufactured by Jakob Rope Systems.
 2. Alternate Manufacturers: Comparable products manufactured by DacorCable Innovations, or accepted equal.
 3. Perimeter Configurations: Type No. 10820-0150, types as shown.

- f. Oversized Louvered Door:
 - 1. General: Fabricate from galvanized structural steel shapes and plates as shown.
 - 2. Frame: Welded construction as shown
 - 3. Louver: Manufactured by United Enertech; type and size as shown.
- g. Equipment Screen and Roof Gate:
 - 1. General: Fabricate from galvanized structural steel shapes and plates as shown.
 - 2. Frame: Welded construction as shown.
 - 3. Metal Siding:
 - a) General: New Wave manufactured by the AEP Span Division of ASC Profiles, Inc.
 - b) Alternate Manufacturers: Comparable products manufactured by the Vulcraft Division of the Nucor Corp., or accepted equal.
 - c) Sheet Steel: ASTM A653, Grade B Structural Quality; with G60 galvanized coating.
- h. Entry Trellis: Fabricate from galvanized steel tubes, shapes and plates, with epoxy finish as shown.
- i. Bollards: Galvanized steel pipe sections with open ends capped, welded and ground smooth.
- j. Ladder: Model 502 Roof Access Ladder manufactured by O'Keeffe's, Inc., or accepted equal.
- k. Play Structure Enclosure: Fabricate from steel shapes and plates, and perforated metal as shown.

3. EXECUTION:

A. PREPARATION:

- 1. Examination: Examine conditions of work in place before beginning work; report defects.
- 2. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Performance:
 - a. General: Install with workers skilled in the particular type of work required.
 - b. Coordination: Deliver miscellaneous metal items to be installed in concrete or masonry, complete with all clips, anchors or bolts necessary to secure them in place.
 - c. Workmanship: Set work plumb and true; properly assemble and erect in a rigid and workmanlike manner. Do cutting, punching, drilling and tapping for attachment of other work coming into contact with fabricated metal work where indicated or as directed. Do necessary cutting, drilling, and fitting for installation of fabricated metal work. Execute drilling, cutting, and fitting carefully; when required, fit work at job before finishing. No burning in field permitted. Replace, or repair parts damaged or injured during erection in an acceptable manner. Drill holes for fasteners to exact diameter as recommended by fastener manufacturer. Oversized holes or holes not properly located that produce misalignment of fastener will be rejected.
 - d. Exposed Steel: Comply with AISC Architecturally Exposed Structural Steel installation requirements.
 - e. Galvanizing: Treat areas burned off or damaged during fabrication or erection with specified repair compound.
 - f. Field Touch-up: Touch-up damaged surfaces and field welds of steel, scheduled to be painted, per SSPC standards.
 - g. Protection:
 - 1. General: After erection, provide proper protection for fabricated metal items from other construction operations.
 - 2. Dissimilar Metals: Isolate with bituminous coating.
- 3. Installation:
 - a. General: Install the metal items, complete as shown.
 - b. Angle Thresholds: Set in concrete, as shown.
 - c. Counter Supports: Anchor to walls and install countertop as shown.
 - d. Steel Pipe Guardrails, Handrails and Posts:
 - 1. General: Set posts as shown; touch-up all primed surfaces damaged during installation. Coordinate with millwork supplier where wood screws are necessary for attachment.
 - 2. Handrail Brackets: Install as shown.
 - e. Stainless Steel Cable Assembly: Install as shown.
 - f. Oversized Louvered Door: Set door plumb, true to level and line and anchor with bolts as shown. Door shall swing freely without racking and binding.
 - g. Equipment Screen and Roof Gate: Install as shown; set gate plumb, true to level and line and anchor with bolts. Gate shall swing freely without racking and binding.
 - h. Entry Trellis: Install as shown.
 - i. Bollards: Set in concrete and fill, as shown.

- fastening; use expansion bolts, unless otherwise shown.
k. Play Structure Enclosure: Install as shown.

* * *

SLIDE POLE SYSTEM

Section 05 51 43

1. GENERAL:

- A. SUMMARY: Provide Slide Pole System, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Slide Pole System:
 - a. General: Model 19 brass fire pole manufactured by McIntire Brass Works, Inc.
 - b. Alternate Manufacturers: No known equal.
 - c. Stationary Pole: 2½ inch diameter, 5/32 inch thick wall, cold drawn brass tubing; height as shown.
 - d. Landing Mats
 - (1) General: ASTM D1056, Grade 2C2-E1, closed cell black neoprene mats.
 - (2) Type 1: 32 inch diameter x 2 inch thick.
 - (3) Type 2: Custom; size as shown.
 - e. Trim: Manufacturers standard floor and ceiling flanges and Floor Trim Kit.
 - 2. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Floor Hole: 37½ inch diameter, minimum.
 - 3. Landing Mats: Install flush with finish floor.
 - 4. Trim: Install as shown. Trim mat to fit space.

* End Division 05 *

Division 06 - WOOD, PLASTICS & COMPOSITES

COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES

Section 06 05 00

1. GENERAL:

- A. SUMMARY: Provide Common Work Results for Wood, Plastics and Composites, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM F2329: Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
 - 2. American Society of Mechanical Engineers (ASME): Standards for anchors and fasteners.
 - 3. American Wood Preservers Association (AWPA): AWPA Book of Standards.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples if specifically requested.
 - 2. Certificates: Submit mill certificate verifying pressure treatment compliance as specified, for each shipment received, in addition to a stamp on each piece of lumber, from an approved independent inspecting agency operating under the overview of the American Lumber Standards Committee, Inc. (ALSC).

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36.
 - 2. Hangers, Clamps, Straps and Anchors:
 - a. General: Manufactured by Simpson Strong Tie Co., Inc.; types as shown.
 - b. Alternate Manufacturers: Comparable products with current ICC ES approval and equal or greater rated load capacity, manufactured by USP Lumber Connectors, or accepted equal. Submit ICC ES Report for review for all alternate products.
 - c. Special Fabrications: Refer to Section 05 50 00 - METAL FABRICATIONS.
 - 3. Anchors and Fasteners:
 - a. General: Comply with ASTM F2329 where connector may be exposed to moisture.
 - b. Nails: ASTM F1667, common wire; hot-dipped galvanized for pressure preservative treated and exterior work; electro-galvanized for other work.
 - c. Bolts and Nuts: ASTM A307, Grade A, including supplementary requirement S1; galvanized for exterior work.
 - d. Washers: Malleable iron or standard cut steel; galvanized for exterior work.
 - e. Screws: Wood and lag screws per ANSI/ASME B 18.2.1; galvanized for exterior work.
 - f. Specialty Fasteners:
 - 1. General: Manufactured by Hilti, Inc.; galvanized for exterior work.
 - 2. Alternate Manufacturers: Comparable products with current ICC ES Report and equal or greater rated load capacity, manufactured by the US Anchor Corp., or accepted equal.
 - 3. Expansion Bolts: Kwik Bolt TZ.
 - 4. Concrete Screws: Kwik Con II; galvanized for exterior work.
 - 5. Powder Actuated Fasteners: Type as shown; galvanized for exterior work.
 - 6. Screw Anchors: Type HUD (plastic)[HFP self drilling][HPS impact].
 - 4. Adhesive: CS 35-61, Type II, water-resistant.
 - 5. Wood Preservative:
 - a. General: Manufactured by J. H. Baxter Co.; factory applied treatment, unless otherwise noted.
 - b. Alternate Manufacturers: Comparable products manufactured by the California Cascade

- c. Pressure Treatment: Per AWWA Standards using water borne preservative.
- d. Surface Application: Per AWWA Standards; Clear type.
- e. Fire Retardant: Per AWWA Standards, Exterior Type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25.

3. EXECUTION:

A. PREPARATION:

- 1. Examination: Examine conditions of work in place before beginning work; report defects.
- 2. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Placement: Refer to Sections 06 10 00 - ROUGH CARPENTRY, 06 20 00 - FINISH CARPENTRY and 06 41 17 - PLASTIC LAMINATE VENEER CASEWORK.

* * *

ROUGH CARPENTRY

Section 06 10 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Rough Carpentry, as shown and specified per Contract Documents.
2. Framing: Lumber, plywood, wood treatments and sheathing.
3. Framing: Floor, wall, roof, post and columns.

B. REFERENCES:

1. American Forest and Paper Association (AFPA): National Design Specification for Wood Construction.
2. American Lumber Standards Committee, Inc. (ALSC): Grading Standards.
3. The Engineered Wood Association (APA): Standard Grading Rules.
4. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
5. American Wood Preservers Association (AWPA): AWPA Book of Standards.
6. Forest Stewardship Council (FSC): "Forest Conservation Program".
7. National Institute of Standards and Technology (NIST):
 - a. NIST PS 1: Construction and Industrial Plywood.
 - b. NIST PS 2: Performance Standard for Wood-Based Structural-Use Panels.
 - c. NIST PS-20: American Softwood Lumber Standard.
8. Redwood Inspection Service (RIS) Division of the California Redwood Association (CRA): Standard Specifications for Grades of California Redwood Lumber.
9. West Coast Lumber Inspection Bureau (WCLIB): Standard Grading Rules No. 17.
10. Western Wood Products Association (WWPA): Western Lumber Grading Rules.

C. SUBMITTALS:

1. General: Submit product data and samples if specifically requested.
2. Certificates:
 - a. Pressure Treatment: Refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
 - b. Lumber Grades: Where lumber and plywood is exposed to view and clear finished, provide Certificates in lieu of grade stamping and trade marks.
3. Closeout: Submit maintenance data.

2. PRODUCTS:

A. MATERIALS:

1. LEED Certification Requirements:
 - a. Certified Wood Products: Use only Forest Stewardship Council (FSC) certified wood products from acceptable FSC sources with Chain of Custody (CoC) documentation and number.
 - b. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36.
2. Grading:
 - a. General: NIST PS-20 and applicable lumberman's association rules, under which each lumber species is produced.
 - b. Grade Marking:
 1. Lumber: CBC Standard 23-1; each piece of lumber, factory marked with official grade mark of grading agency or independent agency operating under the overview of ALSC.
 2. Plywood: CBC Standard 23-2 and PS 1; each panel legibly identified for type, grade and species by APA grade mark.
3. Lumber:
 - a. General: Sizes dressed as shown, surfaced four (4) sides; 19 percent maximum moisture content; air or kiln dried. Boxed heart will not be permitted in lumber 3x or thicker.
 - b. Lumber Grades: Douglas fir-larch; to 4 inch thickness - No. 2; 6 inch thickness and larger - No. 1.
4. Sheathing:
 - a. Plywood: PS 1 or PS 2; APA CD, with exterior glue; sizes as shown.
 - b. Oriented Strand Board (OSB): PS 2; APA rated as shown.
5. Wood Treatment: Refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
6. Hangers, Clamps, Straps, Anchors and Fasteners: Refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.

7. Building Paper:
 - a. General: ASTM D226, 15 lb. asphalt saturated felt.
8. Caulking: Provided under Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Coordinate work specified elsewhere that affects the work of this Section.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Measurements: Take field measurements; report variance between plan and field dimensions.
4. Protection:
 - a. General: Per Section 01 43 00 - QUALITY ASSURANCE.
 - b. Security and Safety: Provide temporary protection and enclosures as required.
 - c. Temporary Bracing: Provide bracing adequate to keep structure stable, plumb and in line; keep in place until permanent framing is completed. Provide bracing capable of supporting loads imposed by stockpiled material, erection equipment and other loads, during construction.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Erection:
 - a. General:
 1. Coordination: Coordinate placement of anchors, inserts, etc., in concrete and masonry. Establish locations, lines, levels and provide cutting, patching and fitting as required to accommodate built-in Work specified in other Sections.
 2. Lumber: Use new lumber; re-use not permitted unless authorized in writing by the Architect. Select lumber in a manner that allowable knots and obvious minor defects do not interfere with placement of bolts, nailing or structural connections.
 3. Layout: As shown; set plates, nailing blocks, anchors, grounds, etc., as required.
 4. Wood Treatment:
 - a) General: Refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
 - b) Site Applied: Brush apply two (2) coats of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashing, and framing within 18 inches of finish grade. Treat site-sawn cuts. Allow preservative to dry prior to erecting members.
 5. Hangers, Clamps, Straps, Anchors and Fasteners:
 - a) General: Refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
 - b) Nails: Per CBC Table 23A-II-B-1 unless otherwise noted. Space groups of nails no closer together than required penetration and not closer than $\frac{1}{2}$ required penetration from cut ends or edges of lumber. Prevent splitting due to nailing drill holes for nails no more than .75 diameter of nail. Where nails of normal length may penetrate through exposed work, use nail of specified diameter and shorter length. Use of nailing gun is subject to written approval of the Architect per CBC 2315A.3.3.
 - c) Bolts and Nuts: Use steel pieces as template for location of holes; drill holes 1/32 inch larger than diameter of bolts; tighten nuts or rods and bolts at time of installation. Re-tighten before covering up and just before final inspection and acceptance of the work; at exposed work, cut protruding bolt ends off to within 1/8 inch of nut and file off burrs.
 - d) Washers: Install at bolts, nuts or lag screws bearing on wood; not required under heads of carriage bolts.
 - e) Screws:
 - 1) General: Hammering or driving in place not permitted. Use soap to lubricate screw threads, if required.
 - 2) Lag Screws: Drill holes of same diameter and depth as shank; drill holes for threaded portion of screw no larger than 3/4 shank diameter.
 - 3) Wood Screws: Drill lead holes for shank and threaded portions, hole diameter 7/8 of shank or thread root diameter.
 - f) Powder Actuated Fasteners:
 - 1) General: Install where shown or required; DO NOT install in structural connections required to carry computed stresses.
 - 2) Application: Per Article 27, Powder-Actuated Tools, Paragraph 1685, of Title 8, CCR.

- b. Installation:
 - 1. General:
 - a) Framing Members: Construct full length without splices; notching permitted only with approval of the Architect.
 - b) Blocking:
 - 1) General: Provide as shown and where necessary to obtain required lines and levels in finished surface and to provide solid nailing. Secure blocking plumb and rigid; use wood shims wherever necessary to form true and even plane for finish materials.
 - 2) Firestopping: Provide per CBC at interior and exterior walls at intersection with floor, ceiling and roof, and at all hollow concealed spaces. Install minimum 2x material by width of enclosed spaces within partition in continuous row to prevent vertical and horizontal draft. Maximum concealed air space of 10'-0" in any direction.
 - 3) Backing: Provide blocking within walls where anchorage is required for equipment and accessories shown.
 - c) Wane: Limit wane to 5 percent of members in accordance with WWPA standards. Do not locate members with wane at plywood sheathing joints, at solid blocking or at double plates.
 - d) Recessed Fixtures: Frame openings for panel boxes and other equipment, as required for fixtures provided.
 - 2. Miscellaneous Framing:
 - a) General: Provide nailers, backing, and stripping as necessary to obtain required lines and levels in finished surface. Secure plumb and rigid; use wood shims where required. Provide backing required for wall or ceiling hung fixtures and equipment.
 - b) Building Paper:
 - 1) General: Apply where shown, with 2 inch horizontal laps and 6 inch vertical laps at joints and corners. Repair damaged paper before installation of finish material.
 - 2) Paper: Use 3/8 inch head galvanized nails spaced adequately to hold paper in place, without buckling.
 - c) Caulking:
 - 1) General: Per Section 07 92 10 - JOINT SEALERS.
 - 2) Energy Compliance: Apply during framing operations as required by CBC.
 - 3) Thresholds: Set in full bed.
 - d) Mechanical and Electrical: Provide curbs, backing and blocking, as required for mechanical and electrical fixtures and equipment.
 - 3. Tolerances: Per Section 01 43 00 - QUALITY ASSURANCE. Install to allow application of subsequent finish materials within specified tolerances.
 - 4. Protection: During inclement weather, protect exposed roof sheathing and wood decking with protective waterproof covering until roofing has been installed.

* * *

FINISH CARPENTRY

Section 06 20 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Finish Carpentry, as shown and specified per Contract Documents.
2. Lumber: Softwood and hardwood.
3. Sheet Materials: Softwood plywood.

B. REFERENCES:

1. The Engineered Wood Association (APA): Grading standards.
2. Forest Stewardship Council (FSC): "Forest Conservation Program".
3. Hardwood Manufacturers Association (HMA): Species Guide and Sustainability.
4. National Institute of Standards and Technology (NIST): NIST PS-20.
5. Scientific Certification Systems (SCS): Certification Standards.
6. California Redwood Association (CRA): Grading Standards.
7. Woodwork Institute (WI): Architectural Woodwork Standards (AWS).

C. SUBMITTALS:

1. General: Submit product data, shop drawings and samples.
 2. Certificates:
 - a. General: WI Certified Compliance Certificate for fabrication and installation of casework in grade specified.
 - b. Hardwood:
 1. General: Submit certification and documentation verifying that hardwood lumber and veneers were obtained from sustainably managed sources and that certified lumber was properly segregated from other materials while in storage and production.
 2. Acceptable Certifying Agencies:
 - a) Rainforest Alliance (RA): "Smart Wood Program".
 - b) Scientific Certification Systems (SCS): Forest Stewardship Council (FSC) - "Forest Conservation Program".
 3. Closeout: Submit maintenance data and guarantee.
- D. QUALITY ASSURANCE: Company specialized in the products specified in this Section with a minimum of three (3) years documented experience.

2. PRODUCTS:

A. MATERIALS:

1. LEED Certification Requirements:
 - a. Certified Wood Products: Use only Forest Stewardship Council (FSC) certified wood products from acceptable FSC sources with Chain of Custody (CoC) documentation and number.
 - b. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36.
2. Lumber:
 - a. General:
 1. Grading: NIST PS-20 and applicable association rules under which each lumber species is produced.
 2. Moisture Content: Per WI standards; not greater than 19 percent maximum for lumber and 15 percent for plywood; air-dry or kiln-dry.
 - b. Exposed Softwood: Douglas fir; WI Custom Grade.
 - c. Hardwood:
 1. General: FSC certified bamboo.
 2. Window Sills: FSC American Elm.
3. Plywood: Douglas Fir; APA, A-C Group 1 Exterior.
4. Wood Preservative Treatment: Refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
5. Adhesive: CS 35-61, Type II, water-resistant.
6. Fasteners:
 - a. General: Of size and type to suit application; hot dipped galvanized at concealed locations; bright finish in exposed locations; refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
 - b. Redwood: Stainless steel at exterior; hot dipped galvanized at interior and concealed locations.
 - c. Concealed Joint Fasteners: Threaded steel.

7. Caulking Compound: Per Section 07 92 10 - JOINT SEALERS.
- B. FABRICATION:
 1. General: Comply with WI requirements for moisture content at time of fabrication.
 2. Millwork:
 - a. General: Manufacture to AWS Custom Grade standards, except where specifically noted otherwise. Mill to dimensions and profiles shown. Provide long lengths for field cutting and fitting.
 - b. Exterior: Per AWS.
 - c. Interior: Per AWS. Mill reverse side of material ("back-out") when lumber is over 5/8 inch thick and more than 1-5/8 inch wide.

3. EXECUTION:

- A. PREPARATION:
 1. Environmental Requirements: Do not install interior finish work until building is closed, temperature can be maintained above 50 degrees F and all plaster is dry.
 2. Examination: Examine conditions of work in place before beginning work; report defects.
 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 4. Protection: Per Section 01 43 00 - QUALITY ASSURANCE.
- B. INSTALLATION:
 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Millwork:
 - a. General: Do not install millwork until wet operations are complete, with concrete, masonry and plaster work thoroughly dry, and millwork has been primed or sealed under Section 09 91 00 - PAINTING. Reseal cut edges, surfaces and ends as required.
 - b. Exterior:
 1. General: Exposed surfaces shall be free from tool marks, torn grain, cross sanding, or workmanship defects that cannot be concealed by specified painter's finish.
 2. Plywood: Install with grain texture vertical; edges and ends occurring only over bearings.
 - c. Interior:
 1. General: Install plumb, square and true, securely wedged and anchored to structure. Countersink face nails.
 2. Plywood: Install with joints bearing on studs or solid backing. Slightly bevel adjoining panel edges by sanding before installation. Finish nail around perimeter and at studs; set nails.
 - d. Trim Members:
 1. General: Install level, plumb and true, with members neatly and accurately scribed in place. Install standing trim in single lengths, running trim in as long lengths as practical for species specified. Butt joints beveled together, exterior angles mitered, interior angles coped.
 2. Exterior: Redwood, unless otherwise shown.
 3. Interior: Douglas fir and hardwood where shown.
 - e. Nailing:
 1. Exterior:
 - a) Trim: 10d nails or less, use finish nails set 1/16 inch without putty; 10d nails or over, use galvanized common nails driven flush without hammer marks or putty.
 - b) Plywood: Nails long enough to penetrate structure per CBC requirements. Use galvanized nails, driven flush without hammer marks.
 2. Interior:
 - a) Trim: Set nails 1/16 inch, minimum; no putty where clear finish is scheduled.
 - b) Plywood: As shown, set nails 1/16 inch, minimum.
 - f. Site Applied Wood Treatment: Apply preservative treatment in accordance with manufacturer's instructions. Brush apply two (2) coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts and drilled holes. Allow preservative to dry prior to erecting members.

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PLASTIC LAMINATE VENEER CASEWORK Section 06 41 17

1. GENERAL:

- A. SUMMARY: Provide Plastic Laminate Veneer Casework, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. The Engineered Wood Association (APA): Grading standards.
 - 3. Builders Hardware Manufacturers Association (BHMA): BHMA A156.9 - Cabinet Hardware.
 - 4. National Institute of Standards and Technology (NIST): PS-20.
 - 5. National Electrical Manufacturers Association (NEMA): NEMA LD3 - High Pressure Decorative Laminates.
 - 6. Woodwork Institute (WI): Architectural Woodwork Standards (AWS).
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Shop Drawings: Submit manufacture and installation details, including fastenings, for review. Provide WI Certified Compliance Label.
 - 3. Certificates: Submit WI Certified Compliance Certificate for fabrication and installation of all casework in grade specified.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Fabricator and installer specializing in the work of this Section with minimum five (5) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. Certified Wood Products: Use only Forest Stewardship Council (FSC) certified wood products from acceptable FSC sources with Chain of Custody (CoC) documentation and number.
 - b. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36.
 - 2. Plastic Laminate:
 - a. General: Class I high-pressure decorative laminate plastic manufactured by Plonite Decorative Surfaces; UBC Class II flame spread.
 - b. Alternate Manufacturers: Comparable products manufactured by the Formica Corp., or accepted equal.
 - c. Plastic Veneer: NEMA Standard .039 inch postforming grade and .045 inch general purpose grade; satin finish.
 - d. Backing Sheets and Interior Cabinet Surfaces: .020 inch thick standard laminate.
 - e. Colors and Patterns: As shown.
 - 3. Hardwood Plywood:
 - a. General: FSC PlybooStrand manufactured by the Smith and Fong Co.
 - b. Alternate Manufacturers: No known equal.
 - c. Thickness: As shown.
 - d. Finish: Neopolitan and Amber, where shown.
 - 4. Solid Phenolic Core Panels:
 - a. General: DEBO Phenolic Resin Sheet manufactured by Shenzhen Risewell Industry Co., Ltd.
 - b. Alternate Manufacturers: No known equal.
 - c. Thickness: As shown.
 - d. Color and Pattern: As selected by the Architect.
 - e. Flame Spread: UL 723, Class 1; 25 to 200.
 - 5. Solid Plastic Countertops: Refer to Section 06 64 25 - SOLID POLYMER FABRICATIONS.
 - 6. Lumber: AWS Custom Grade standards; particleboard and MDF not permitted.
 - 7. Casework Hardware:
 - a. General: Per AWS, BHMA A156.9, and as follows:
 - b. Finish: Exposed hardware; dull chromium (US26D).
 - c. Hinges:
 - General: Model No. 374-26D, manufactured by Rockford Process Control, Inc.

2. Alternate Manufacturers: Comparable products manufactured by the Stanley Hardware Division of the Stanley Works, or accepted equal.
 - d. Door and Drawer Pulls:
 1. General: Model No. AS54-128SS manufactured by the Engineered Products Co. (EPCO).
 2. Alternate Manufacturers: Comparable products manufactured by Häfele America Co., or accepted equal.
 - e. Magnetic Catches:
 1. General: No. 592 manufactured by the Engineered Products Co. (EPCO).
 2. Alternate Manufacturers: Comparable products manufactured by the Ives Division of IR Security & Safety, or accepted equal.
 - f. Silencers:
 1. General: Silencers manufactured by Ceco Building Systems Division of Robertson-Ceco.
 2. Alternate Manufacturers: Comparable products manufactured by North American Door Corp. (NADCOR), or accepted equal.
 - g. Locks:
 1. General: Small Pin manufactured by the Olympus Lock, Inc.; provide unit for cylinders as specified in Section 08 71 00 - DOOR HARDWARE.
 2. Alternate Manufacturers: Comparable products manufactured by National Cabinet Lock, or accepted equal.
 - h. Cam Locks:
 1. General: Padlockable Cam Lock manufactured by the Padlockable Cam Lock Division of FJM Security; padlocks as specified in Section 08 71 00 - DOOR HARDWARE.
 2. Alternate Manufacturers: No known equal.
 - i. Drawer Guides:
 1. General: Manufactured by Accuride International, Inc.
 2. Alternate Manufacturers: Comparable products manufactured by the Knappe and Vogt Manufacturing Co, or accepted equal.
 3. Small Drawer: Model No. 2037; 75 lbs.
 4. Self Closing Medium Drawer: Model No. 7432SC; 100 lbs.
 5. Self Closing Large Drawer: Model No. 3832HDSC; 150 lbs.
 6. Bed Drawers: Model No 9301 - 30 inch Extra Heavy-Duty Full-Extension.
 - j. Adjustable Shelf Hardware:
 1. General: Manufactured by Knappe and Vogt Manufacturing Co.
 2. Alternate Manufacturers: Comparable products manufactured by the Stanley Hardware Division of the Stanley Works, or accepted equal.
 3. Brackets: Model No. 255 Pilasters, steel.
 4. Supports: Model No. 256 Pilaster Supports, steel.
 - k. Hole Plugs:
 1. General: 2 inch diameter 26 Series manufactured by Outwater Plastic Industries, Inc.; color selected by the Architect.
 2. Alternate Manufacturers: Comparable products manufactured by the Stanley Hardware Division of the Stanley Works, or accepted equal.
 - l. Heavy Duty Casters:
 1. General: Manufactured by Tente USA; provide hard casters for use on carpet and soft casters for use on hard flooring.
 2. Alternate Manufacturers: Comparable products manufactured by the Master Manufacturing Co., or accepted equal.
 3. Fixed: Model No. 7478XSC100P50
 4. Swivel: Model No. 7477XSC100P30-13
 5. "U" Bracket Casters: Model No. PW20NS manufactured by the Master Manufacturing Co., or accepted equal.
 - m. Sliding Waste Container:
 1. General: Model 5349-15DM18-1SS manufactured by Rev-A-Shelf.
 2. Alternate Manufacturers: No known equal.
 8. Fasteners and Adhesives: Per WI requirements; refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
- B. FABRICATION:
1. General: Manufacture Architectural Woodwork Standards (AWS), Section 10 - Casework, to to AWS Custom Grade standards, except where specifically noted otherwise, per AWS. Provide WI Certified Compliance Label for grade specified, to each elevation of casework.
 2. Construction:
 - a. General: Completely face exposed and semi-exposed surfaces, with plastic laminate. As far as practical, fabricate casework complete as a unit in the shop; backs required.

- c. Door and Drawer Fronts: Cabinet door Interface Style 1- Overlay, unless otherwise shown.
 - d. Phenolic Door Fronts and Drawer Boxes: Provide where shown.
 - e. Shelves: Plastic laminate faced plywood.
 - f. Filler Panels: As required; to match cabinets as shown.
3. Countertops:
- a. General: Fabricate per Architectural Woodwork Standards (AWS), Section 11 - Countertops, Assembly 2 - Deck Mount, manufacturer assembled, as shown. Provide in longest practicable length; minimize number of joints. Make joints neat and watertight; abutting ends splined and adjoining surfaces flush; ease exposed edges. Provide backing sheet on bottom side of countertops where plumbing fixtures are to be installed or where exposed to moisture. Core thickness as shown; not less than 3/4 inch.
 - b. Linoleum and Hardwood: Fabricate as shown with aluminum edging.
 - c. Solid Plastic: Refer to Section 06 64 25 - SOLID POLYMER FABRICATIONS.
 - d. Metal Countertops: Refer to Section 07 60 00 - FLASHING AND SHEET METAL.
4. Casework Hardware:
- a. General: Prefit; remove for application of finish. Keep hardware with casework to which it has been prefit; reinstall after casework is anchored in place, as shown.
 - b. Hinges: Four (4) No. 8 screws into end panel and door panel; 1-1/2 pair on 7'-0" high cabinet doors; tall cabinet doors must swing 180 degrees when adjacent to low cabinets without interference from counter top.
 - c. Drawer and Door Pulls: Comply with CBC 1125 B.4.
 - d. Magnetic Catches: One catch on cabinet doors up to 48 inches high; two catches (top and bottom) on cabinet doors over 48 inches high.

3. EXECUTION:

A. PREPARATION:

- 1. Scheduling: Coordinate placement of blocking and reinforcement in walls supporting casework.
- 2. Environmental Requirements: Relative humidity 50% or less; temperature 70 degrees F minimum.
- 3. Examination: Examine conditions of work in place before beginning work; report defects. Verify the placement of plumbing and electrical service required by built-in equipment and accessories shown.
- 4. Measurements: Take field measurements prior to fabrication; report variance between plan and field dimensions.
- 5. Delivery: Use clean, nonstaining materials for blocking and packing. Carefully load and cover for shipment; do not transport during inclement weather.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Provide WI Certified Compliance Certificate for Installation.
- 2. Casework:
 - a. General: Install level, with tight joints between units; scribe edges to fit adjacent structure. Use concealed joint fasteners to align and secure adjoining cabinet units, counter tops and support brackets. Secure to blocking or plates in wall or to casework carriers with lag bolts with washers to permit removal; screw penetration of not less than 1 inch into 2 inch nominal blocking or framing is required.
 - b. Filler Panels: Scribe to cabinets and abutting structure.
- 3. Countertops:
 - a. General: Install level, using concealed fasteners, with tight joints; scribe to fit wall surfaces.
 - b. Solid Plastic: As shown, per Section 06 64 20 - PLASTIC PANEL FABRICATIONS.
 - c. Metal Countertops: Refer to Section 07 60 00 - FLASHING AND SHEET METAL.
- 4. Hardware:
 - a. General: Check hardware upon delivery to site; store in an orderly manner. Fit and install in place without marring or injuring either hardware or casework.
 - b. Seismic Restraint: As shown.

C. ADJUSTMENT: Prior to acceptance, adjust moveable parts to assure smooth operation.

D. CLEANING: Immediately following installation, clean casework to remove dirt, stains, scratches, and abrasions. Protect casework against damage by other trades; repair or replace damaged and defaced material at no cost to City.

E. JOBBING Six (6) months after final acceptance of the building, and at any time within a year after acceptance when so directed, examine casework doors, drawers, fittings, etc., and perform such fitting and adjustment as necessary to put items in good condition and working order.

* * *

SOLID POLYMER FABRICATIONS

Section 06 64 25

1. GENERAL:

- A. SUMMARY: Provide Solid Polymer Fabrications, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American National Standards Institute (ANSI): Standards.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit guarantee in required form for a period of one (1) year from date of final acceptance by City.
 - 3. Maintenance Data: Manufacturer's instructions.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36.
 - 2. Counter Tops:
 - a. General: Avonite Studio Class I manufactured by the Avonite Surfaces Division of Aristech Acrylics, LLC.
 - b. Alternate Manufacturers: No known equal.
 - c. Thickness: As shown.
 - d. Integral Sinks: VS-1815 sink bowl, formed integrally with countertops.
 - e. Color: Avonite White; Fi-8016 White.
 - f. Fire Test Response Characteristics: ASTM E84 flame spread less than 75; smoke developed of less than 450.
 - 3. Adhesive: As recommended by manufacturer.
 - 4. Fasteners: As recommended by manufacturer; refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.
 - 5. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.
 - 6. Cleaner: As recommended by manufacturer.
- B. FABRICATION:
 - 1. General: Shop fabricate to shapes as shown; radius exposed edges 1/16 inch.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Delivery: Deliver no components to project site until areas are ready for installation; store indoors.
 - 4. Protection: Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of Project.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

* * *

FIBERGLASS REINFORCED PANELS

Section 06 83 16

1. GENERAL:

- A. SUMMARY: Provide Fiberglass Reinforced Panels, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American National Standards Institute (ANSI): ANSI/ISO 820 - Particle boards - Definition and Classification.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings, color and texture samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. F.R.P. (Fiberglass Reinforced Polyester) Panels:
 - a. General: Standard integral color FRP Panels with pebbled gloss finish manufactured by the Marlite Corp.; ASTM E84, Class 1/A flame spread of 25 and smoke generation of 450, maximum; color as selected by the Architect.
 - b. Alternate Manufacturers: Comparable products manufactured by Glasteel, Inc., or accepted equal.
 - c. Moldings and Trim: Manufacturer's standard clear anodized Inside Corner, Outside Corner, Division and Edge Aluminum trim as required for condition as shown.
 - d. Adhesive and Sealant: As recommended by the manufacturer for substrate shown.
 - 3. Fasteners: Concealed type as recommended by the manufacturer; refer to Section 06 05 00 - COMMON WORK RESULTS FOR WOOD, PLASTICS AND COMPOSITES.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements: Relative humidity of 50% or less; minimum temperature of 70 degrees F.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements:
 - a. General: Take field measurements; report variance between plan and field dimensions.
 - b. Stud Spacing: Verify that backing is installed as required.
 - 4. Product Handling: Deliver F.R.P. Panels flat, on skids; store inside, out of weather and exposure to sunlight. Re-stack panels 24 hours prior to installation, on solid flat surface to minimize package distortion.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. F.R.P. Panels:
 - a. General: Adhesive apply per manufacturer's instructions; apply sealant as required.
 - b. Moldings and Trim: Install as shown.

* End Division 06 *

Division 07 - THERMAL & MOISTURE PROTECTION

ELASTOMERIC SHEET WATERPROOFING Section 07 13 53

1. GENERAL:

- A. SUMMARY: Provide Sheet Waterproofing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.
 - c. ASTM E154: Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - d. ASTM C836: Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 - e. ASTM D903: Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - f. ASTM D1876: Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
 - g. ASTM D1970: Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - h. ASTM D5385: Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
 - 2. National Roofing Contractors Association (NRCA): NRCA Waterproofing Manual.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit samples.
 - 2. Product Data: Submit manufacturer's specifications, data, and installation instructions for review. Include data indicating VOC content.
 - 3. Certificates: Certify that membrane meets or exceeds specified requirements.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved. Applicator shall designate a single individual as project foreman who shall be on site at all times during installation.
 - 2. Pre-application Job-site Conference: Scheduled by applicator with one week advance notice; to be attended by applicator, his working foreman, Architect, and waterproofing material manufacturer's agent. Discuss requirements of related work surface preparation, storage and handling, protection measures, materials and application specifications, and procedure to assure proper adhesion of materials shown.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Sheet Waterproofing:
 - a. General: Specified products are manufactured by the Chargar Corporation.
 - b. Alternate Manufacturers: Comparable products manufactured by Grace Construction Products, or accepted equal.
 - c. Waterproofing System:
 - 1. General: Duramem 700-SM.
 - 2. Primer: VOC compliant, as recommended by the manufacturer.
 - 3. Elastomeric Sheet Membrane: 60 mils thick.
 - 3. Sheet Drain: Dura Drain Soil Sheet Drain, as recommended by manufacturer.
 - 4. Protection Board: As recommended by the manufacturer; thickness as shown.
 - 5. Sealant: As recommended by manufacturer.

3. EXECUTION:

A. PREPARATION:

1. Environmental Requirements: Temperature above 50 degrees F. during installation and curing.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Measurements: Take field measurements; report variance between plan and field dimensions.
4. Protection: Protect work exposed to view from damage during application and backfilling.
5. Surface Preparation: Prepare surfaces to receive waterproofing per manufacturer's instructions. Seal penetrations, small cracks and other imperfections in substrate.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Primer: Apply brush or spray coat to surfaces as recommended by manufacturer.
3. Reinforcing: Reinforce membrane angles at footings, corners or offsets and around knock-out panels with an extra application of emulsion and glass fabric.
4. Waterproofing Membrane: As shown, per manufacturer's recommendations. Roll surface to remove wrinkles and assure adhesion.
5. Sheet Drain: As shown, per manufacturer's recommendations.
6. Protection Board: Install to within 6 inches of top of finish grade; brace to hold in place during backfilling.

* * *

BENTONITE WATERPROOFING

Section 07 17 00

1. GENERAL:

- A. SUMMARY: Provide Bentonite Waterproofing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. National Roofing Contractors Association (NRCA): NRCA Waterproofing Manual.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Shop Drawings: Submit manufacture and installation details, including fastenings, for review. Indicate required flashings and waterproofing of holes, slots, sleeves and joints.
 - 3. Samples: If specifically requested.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. General: Refer to Soils Report to establish waterproofing system capable of resisting water penetration and prevent moisture migration.
 - 2. Applicator: Company specializing in performing the work of this Section with minimum three (3) years documented experience and approved by manufacturer.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Bentonite Waterproofing:
 - a. General; MiraDRAIN 9900 and other bentonite waterproofing products as shown, manufactured by Carlisle Coatings and Waterproofing.
 - b. Alternate Manufacturers: Comparable products manufactured by Tremco, Inc., or accepted equal.
 - 2. Lagging: As recommended by manufacturer.
 - 3. Flexible Flashing: As recommended by manufacturer.
 - 4. Protection Board: Type recommended by manufacturer.
 - 5. Termination Bar: As recommended by manufacturer.
 - 6. Adhesive: Manufacturer's recommended type.
 - 7. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements:
 - a. General: Install materials during dry conditions; do not install during inclement weather.
 - b. Temperature: Maintain ambient temperature above 40 degrees F for 24 hours before and during application.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Delivery: Store bentonite products in dry condition; protect with waterproof cover.
 - 4. Protection: Verify that proper care is taken in placing and vibrating concrete to avoid panel damage. Replace panels damaged by precipitation or other causes, before and during concrete pour.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Walls:
 - a. General: Attach to lagging as shown; lap edges 1-1/2 inches; stagger vertical joints between courses.
 - b. Lagging: Install as recommended by manufacturer.
 - c. Joint Seal: Fill penetrations holes and cracks and seal through wall projections as required.
 - 3. Under Slabs: Lay in position, lap adjoining panel edges 1-1/2 inches; fold panels up side walls.
 - 4. Over Slabs: Cover surfaces where shown; lap and stagger joints as specified and fold panels down side walls and lap side wall panels.
 - 5. Protection Board: Do not allow traffic over unprotected or uncovered waterproofing. Install protection board where shown or as required to protect exposed waterproofing.
 - 6. Termination Bar: Install as shown.

* * *

ELASTOMERIC DECK COATING

Section 07 18 00

1. GENERAL:

- A. SUMMARY: Provide Elastomeric Deck Coating, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data, and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Elastomeric Deck Surface:
 - a. General: Elasto-Deck 6500PT manufactured by Pacific Polymers International, Inc.; color selected by the City Representative.
 - b. Alternate Manufacturers: Comparable products manufactured by BASF Building Systems, or approved equal.
 - c. Sealant: Elasto-Thane 230.
 - d. Primer: Elasto-Poxy.
 - e. Coating: Elasto-Deck 6500PT two component, flexible, low-odor polyurea deck coating.
 - f. Sheet Flashing: .050 inch thick, pre cured, commercial grade neoprene.
 - g. Flashing Tape: As recommended by manufacturer.
 - h. Aggregate: 20 mesh sand.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements: Do not apply during inclement weather or when temperature is below 40 degrees F., or greater than 90 degrees F.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 4. Protection: Provide control barriers to restrict traffic in work area during installation and curing. Protect adjacent surfaces; repair or replace work damaged by operations under this Section.
 - 5. Surface Preparation:
 - a. General: Assure that surfaces are dry and completely cleaned of foreign materials.
 - b. Concrete: Remove dirt, oil, laitance and other contamination by acid etch, sandblasting, scarification or hot detergent cleaner.
 - c. Wood: Assure that deck is well fitted, blocked and fastened with flat head screws or ring shank nails.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Coating System: Calk, reinforce and prepare joints to level condition; apply flashing and apply primer, per manufacturer's instructions. Apply base and intermediate coats to 25 mil thickness each coat. Apply color top coat; cure per manufacturer's instructions.

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WATER REPELLENTS

Section 07 19 00

1. GENERAL:

- A. SUMMARY: Provide Water Repellents, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, samples, and jurisdictional VOC compliance certificate.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of five (5) years from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance:
 - a. General: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and the following:
 - b. Waterproofing Sealers: Green Seal Standard GS-47.
 - 2. Water Repellents:
 - a. General: Siloxane PD manufactured by ProSoCo, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the BASF Building Systems, or accepted equal.
 - 3. Cleaning Materials: As recommended by the manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 2. Environmental Requirements:
 - a. General: Do not apply water repellent under the following conditions:
 - 1. Temperature: Ambient or substrate surface temperature is less than 40 degrees F or inclement weather or temperatures below 40 degrees F are predicted within 24 hours.
 - 2. Moisture: Minimum 24 hours after surfaces have been wet.
 - b. Windy Conditions: Do not apply when conditions may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.
 - 4. Surface Preparation:
 - a. General: Clean application surfaces of substances that might interfere with penetration or performance of water repellents. Test for moisture content and pH level per manufacturer's instructions.
 - b. Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
 - c. Brick Masonry: Clean clay brick masonry per ASTM D5703.
 - 5. Test Application: Pretest the water repellent material on a 3'-0" x 3'-0" section of the masonry and concrete to ensure stability and desired results.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Application:
 - a. General: Use low-pressure spray equipment. Comply with manufacturer's instructions for using airless spraying procedure, unless otherwise indicated.
 - b. First Coat: Apply heavy-saturation spray coating of water repellent on surfaces indicated for treatment.
 - c. Drying Time: Per manufacturer's directions.
 - d. Second Coat: Apply saturation spray coating, repeating first application.
 - 3. Overspray: Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application, as work progresses. Repair damage caused by water-repellent application.

THERMAL INSULATION

Section 07 21 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Thermal Insulation, as shown and specified per Contract Documents.
2. Types: Battinsulation.

B. REFERENCES:

1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
2. North American Insulation Manufacturers Association (NAIMA): Manufacturing standards.
3. Underwriters Laboratories, Inc. (UL): UL 723 - Tests for Surface Burning Characteristics of Building Materials.
4. California Building Code (CBC): Standard 8-1.

C. SUBMITTALS:

1. General: Submit product data, samples, and certification that insulating materials comply with California Quality Standards for insulating materials.
2. Closeout: Submit maintenance data and guarantee.

2. PRODUCTS:

A. MATERIALS:

1. Manufacture:

- a. General: Formaldehyde free, regionally manufactured products are manufactured by Owens Corning, unless otherwise noted.
- b. Alternate Manufacturers: Comparable products manufactured by the Johns-Manville Corp., or accepted equal.
- c. Recycled Metal Content: Use materials with recycled content of at least 20%.
- d. Thickness: As shown; where not shown, as needed to meet CBC requirements.

2. Batt Insulation:

a. General:

1. Thermal: R-19 EcoTouch Pink Fiberglas Batts and R-30 EcoTouch Pink Fiberglas Batts, unfaced; ASTM C665 Type I; ASTM E84, flame spread 10, smoke developed 10.
2. Fire Rated: Flame Spread 25 Insulation, FSK-faced; ASTM C665, Type III, Class A; ASTM E84 flame spread of 25, smoke developed of 50.

- b. Suspended Ceilings: Sonobatts, unfaced; ASTM C665 Type I; ASTM E84, flame spread 10, smoke developed 10.

3. Sound Insulation:

- a. General: EcoTouch Quiet Zone Sound Attenuation Batt Insulation; ASTM C665, Type 1.
- b. Fire Rated: Fire Rated Sound Attenuation Batt Insulation; ASTM C665, Type 1, and ASTM E119.

4. Vapor Barrier Membrane: 10 mil plastic sheet; FS L-P-377B.

5. Fasteners:

a. Mechanical:

1. General: As recommended by manufacturer, for application as shown.
2. Staples: 7/16 inch wire staples.
3. Nails: 11 gage, barbed, galvanized; 5/8 inch diameter heads.

b. Wire:

1. General: 16 or 18 gage steel.
2. Supports: As recommended by manufacturer.

c. Adhesive: As recommended by manufacturer.

- d. Tape: As recommended by manufacturer, for application shown.

6. Sealants: Per Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

A. PREPARATION: Examine conditions of work in place before beginning work; report defects.

B. INSTALLATION:

1. General: Install at exterior walls; ceilings below roof areas, where shown; and other locations, including above suspended ceilings, in strict conformance with referenced standards, the manufacturer's written directions, and as shown. Install wall and ceiling insulation to create complete thermal enclosure around habitable space.
2. Batt Insulation:

a. Ceilings:

1. General: Install with friction fit at sides and firmly butted ends without gaps or voids.

2. Suspended Ceilings: Place on top of suspended ceiling materials, excluding light fixtures. Fit snugly between ceiling supports and at edges and ends to minimize air

leaks; extend 12 inches beyond wall lines of rooms to be insulated. Where walls or plenum barriers extend above ceiling, place 12 inch width of batt on opposite side, adjacent to wall or plenum barrier.

- b. Stud Walls: Install with friction fit at sides and firmly butted ends without gaps or voids; attach faced insulation to studs at 4 inches on center; minimize air leaks.
3. Sound Insulation: Friction fit to cavity where shown at interior walls.
4. Vapor Barrier Membrane: Staple to exterior framing; lap sheets 4 inches minimum; seal membrane at door and window openings with caulking as specified under Section 07 92 10 - JOINT SEALERS.

* * *

FOAMED-IN-PLACE INSULATION

Section 07 21 19

1. GENERAL:

- A. SUMMARY: Provide Foamed-in-place Insulation, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C518: Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - c. ASTM C1338: Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
 - d. ASTM D1622: Test Method for Apparent Density of Rigid Cellular Plastics.
 - e. ASTM D1623: Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - f. ASTM D2126: Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
 - g. ASTM D2856: Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.
 - h. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.
 - i. ASTM E90: Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - j. ASTM E96: Test Method for Water Vapor Transmission of Materials.
 - k. ASTM E283: Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Differences Across the Specimen.
 - 2. Spray Foam Insulation Association (SFIA): Equipment safety guidelines,
 - 3. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Closeout:
 - a. General: Submit maintenance data.
 - b. Guarantee:
 - 1. General: Provide in required form for a period of one (1) year from date of final acceptance by City.
 - 2. Product Warranty: Manufacturers standard lifetime warranty.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience, manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 - 2. Foamed-in-place Insulation:
 - a. General: BioBased 501w insulation manufactured by the Rhino Linings Corp.
 - b. Alternate Manufacturers: No known equal.
 - c. Thermal Resistance: Thickness and R value as shown.
 - 3. Sealant: As recommended by manufacturer; refer to Section 07 92 10 - JOINT SEALERS.
- B. MIXES:
 - 1. General: Mix Part A and Part B components as directed by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Verify that members, substrates, and rough-ins for electric and plumbing or other work within spaces to be insulated is complete prior to application. Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Protection: Mask floors, walls, windows, doors and areas to be protected from overspray and damage.
 - 4. Surface Preparation: Remove foreign materials from substrates that may affect application; apply sealant where needed to fill small voids in areas to receive foam.
 - 5. Field Mockup: Construct at a location designated by the City's Representative a 4'-0" x 4'-0"

mock-up illustrating conditions and minimum requirements at framing and substrates. Retain accepted mock-up as part of the completed Project.

B. APPLICATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Foamed-in-place Insulation: Apply using spray equipment recommended by manufacturer to a reasonably uniform monolithic density without voids. Spray foam to thickness as shown. fill voids around doors, windows and around service and equipment penetrations.

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METAL ROOF PANELS

Section 07 41 13

1. GENERAL:

- A. SUMMARY: Provide Metal Roof Panels, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. National Roofing Contractors Association (NRCA):
 - a. General: NRCA Roofing and Waterproofing Manual.
 - b. Metal Roof Panels: NRCA Roofing Manual - Metal Panel and SPF Systems.
 - 3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
 - 4. Steel Structures Painting Council (SSPC): Standards.
 - 5. Underwriters Laboratories, Inc. (UL):
 - a. General: Fire Resistance Directory and Building Material Directory.
 - b. UL 997: Wind Uplift Standards.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Metal Roof Panels:
 - a. General: Manufactured by AEP-Span, Inc., Division of ACS Profiles.
 - b. Alternate Manufacturers: Comparable products manufactured by Metal Building Components, Inc. (MBCI), or accepted equal.
 - c. Fire Rating: UL Class "A" fire retardant.
 - d. Panel System:
 - 1. General: 22 gage steel; longest practical length.
 - 2. Span-Lok: Standard 2 inches high and 16 inches wide.
 - e. Accessories: Manufacturer's standard, as shown.
 - f. Finish: Factory applied fluoropolymer paint system; "Regal White" color.
 - g. Fasteners: Corrosion resistant per CBC Standard No. 25-17; exposed fasteners finished to match panel finish.
 - 2. Underlayment:
 - a. General: ASTM D226; No. 15 unperforated asphalt saturated felt.
 - b. Self Sealing Underlayment:
 - 1. General: Rain-Proof High Performance Roof Underlayment and Tile Flash 60 XL manufactured by Protecto Wrap Co.
 - 2. Alternate Manufacturers: Comparable products manufactured by Grace Construction Products, or accepted equal.
 - 3. Flashings:
 - a. General: As shown, same gage and finish as roofing material.
 - b. Penetration Flashings: As recommended by roofing manufacturer.
 - 4. Plastic Cement: ASTM D2822, asphalt type.
 - 5. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.
 - 6. Asphaltic Paint: Cold-applied asphalt mastic per SSPC requirements.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Protection: Protect panels from contact with lime, cement or chemicals. Do not allow traffic or material storage on completed roof surface.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Underlayment:
 - a. General: Lay dry with 6 inch minimum lap horizontally and 12 inch minimum end lap.
 - b. Self Sealing Underlayment: Install per manufacturer's instructions, where as shown.
 - 3. Flashings: Install as shown.

4. Panels:
 - a. General: Install plumb, straight, square and level; at proper elevations; locations and in alignment with adjacent work. Attach panels with fully concealed galvanized steel anchor clips. No perforation of panels by anchoring fasteners is allowed, except as shown or necessary for flashing and trim members. Tightly close interlocking seam between panels. Finish panels clean, securely fastened to structure, and weathertight. Work showing dents, creases, deformations, weathering or other defects affecting use or appearance will not be accepted.
 - b. Accessories: Install where required and as shown.
 - c. Penetrations: Seal pipes, vents, etc., penetrating the roofing material with sleeves and flanges of the type and size to provide a waterproof installation.
 - d. Dissimilar Metals: Coat with asphaltic paint; 7-1/2 mil thickness, minimum, each surface.
5. Expansion and Contraction: Allow for expansion and contraction over an ambient temperature range up to 150 degrees F; distortions resulting from fastening or expansion and contraction stresses are not acceptable
6. Sealant: Apply as required to provide watertight installation per Section 07 92 10 - JOINT SEALERS.

* * *

METAL WALL PANELS

Section 07 42 13

1. GENERAL:

- A. SUMMARY: Provide Metal Wall Panels, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
 - 3. Steel Structures Painting Council (SSPC): Standards.
 - 4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Metal Wall Panels:
 - a. General: Manufactured by AEP-Span, Inc., Division of ACS Profiles.
 - b. Alternate Manufacturers: Comparable products manufactured by Metal Building Components, Inc. (MBCI), or accepted equal.
 - c. Panels:
 - 1. Exterior:
 - a) General: Nu-Wave Corrugated System.
 - b) Description: Corrugated wall panels, 22gage.
 - c) Accessories: Manufacturer's standard, as shown.
 - d) Finish: Factory applied fluoropolymer finish; "Regal White" color.
 - e) Fasteners: Corrosion resistant; exposed fasteners finished to match panel finish.
 - 2. Interior:
 - a) General: Nu-Wave Corrugated System.
 - b) Description: Corrugated wall panels, 24gage; perforated (13.8% open) and unperforated, where shown.
 - c) Accessories: Manufacturer's standard, as shown.
 - d) Finish: Manufacturer's standard; "Regal White" color.
 - e) Fasteners: Exposed fasteners finished to match panel finish.
 - 2. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.
 - 3. Asphaltic Paint: Cold-applied asphalt mastic per SSPC requirements.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Panels:
 - a. General: Install plumb, straight, square and level; at proper elevations, locations and in alignment with adjacent work. Attach panels as shown. Work showing dents, creases, deformations, weathering or other defects affecting use or appearance will not be accepted.
 - b. Exterior: No perforation of panels by anchoring fasteners is allowed, except as shown or necessary for flashing and trim members. Tightly close interlocking seam between panels. Finish panels clean, securely fastened to structure, and weathertight.
 - c. Interior: Install as shown.
 - d. Accessories: Install where required and as shown.
 - 3. Expansion and Contraction: Allow for expansion and contraction over an ambient temperature range up to 150 degrees F; distortions resulting from fastening or expansion and contraction stresses are not acceptable.
 - 4. Sealant: Apply as required to provide watertight installation per Section 07 92 10 - JOINT SEALERS.

THERMOPLASTIC MEMBRANE ROOFING **Section 07 54 00**

1. GENERAL:

- A. SUMMARY: Provide Thermoplastic (TPO) Membrane Roofing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Intertek Testing Services (ITS): Fastening requirements.
 - 3. National Roofing Contractors Association (NRCA):
 - a. General: NRCA Roofing and Waterproofing Manual.
 - b. Membrane Roofing: NRCA Roofing Manual - Membrane Roof Systems.
 - 4. Single-Ply Roofing Institute (SPRI): Wind Design Guide for Single-ply Roofing Systems.
 - 5. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout:
 - a. General: Submit maintenance data and guarantee in required form for a period of fifteen (15) years from date of final acceptance by City. Guarantee covering necessary repairs, up to and including full replacement costs, as required, regardless of cost.
 - b. Reflectance Warranty: Provide in required form for a period of ten (10) years at no additional cost.
- D. QUALITY ASSURANCE:
 - 1. Qualifications:
 - a. General: Factory trained and approved applicator; with a minimum of two (2) years experience installing the single-ply roofing system.
 - b. Applicator-Manufacturer Review: Provide Drawings and Specifications review by Applicator with agent of roofing manufacturer; obtain manufacturer's agreement that specified system is proper for application shown.
 - c. Pre-Application Job-Site Conference: Arranged by Applicator, with a minimum of one (1) week advance notice; for review of storage, handling, protection, surface preparation, materials and application specifications; attended by Applicator, his foreman, Architect and manufacturer's agent.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Thermoplastic Polyolefin (TPO) Membrane Roofing:
 - a. General: Mechanically Attached Sure Weld Roofing System manufactured by Carlisle SynTec Inc., Div. of Carlisle Corp.
 - b. Alternate Manufacturers: Comparable products manufactured by Versico, or accepted equal.
 - c. Fire Rating: UL Class "A" fire retardant.
 - d. Wind Rating: 55 mph, minimum.
 - e. Membrane:
 - 1. General: .080 thick scrim reinforced thermoplastic polyolefin (TPO) sheet.
 - 2. Perimeter Membrane: 4'-0" as recommended by manufacturer.
 - 3. Field Membrane: 8'-0" as recommended by manufacturer.
 - 4. Color: White.
 - 5. Flashing:
 - a) General: Reinforced.
 - b) Vent, Pipe, Drain and Corner Flashing: As recommended by manufacturer; color to match general membrane.
 - 6. Walkway Pads: Manufacturer's standard.
 - 7. Primer, Adhesive and Sealant: Manufacturer's standard low VOC.
 - f. Fasteners: Non corrosive type as recommended by manufacturer for application shown.
 - 3. Accessories: Manufacturer's standard, as shown.
 - 4. Underlayment:
 - a. General: ½ inch Dens Deck DuraGuard Roof Board manufactured by Georgia-Pacific Corp.
 - b. Alternate Manufacturers: Comparable products manufactured by the United States Gypsum Co., or accepted equal.
 - c. Adhesive: As recommended by manufacturer.

- d. Fasteners: Appropriate for use intended and approved for fire rating required.
- 5. Cant Strips: FS LL-I-535, 2 inch x 2 inch fiberboard, unless shown otherwise.
- 6. Sealant: As recommended by roof membrane manufacturer.

3. EXECUTION:

A. PREPARATION:

- 1. Environmental Requirements: Do not apply wet roofing, on wet application surface, or when temperature of deck is less than 50 degrees F.
- 2. Examination: Examine conditions of work in place before beginning work; report defects.
- 3. Coordination: Provide entire roof system including treated wood nailers and coordination of items such as roof drains, sumps, jacks, etc., as specified in Section 07 60 00 - FLASHING AND SHEET METAL.
- 4. Protection:
 - a. General: Protect adjoining materials from stains particularly around perimeter of building; prevent debris from clogging roof drains.
 - b. Temporary Waterproofing: Provide temporary protective sheeting over uncovered deck surfaces. Turn sheeting up and over parapets and curbing; retain in position with weights or temporary fasteners, as required. Provide for surface drainage from sheeting to existing roof drains. Roofing contractor is fully liable for water entry and resulting damage to the building, its contents, or roofing work.
- 5. Surface Preparation:
 - a. General: Deck surface swept clean and dry; keep free of loose and foreign materials.
 - b. Existing Deck: Remove existing roofing material as shown. Repair existing deck surface to provide smooth working surface for new roofing. Provide dry deck surface, free of rough spots, ridges, projections, pockets or depressions.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Rigid Insulation: Refer to section 07 21 00 - THERMAL INSULATION.
- 3. Underlayment: As required for fire rating.
- 4. Cant Strips: Install in angle of intersections of roof deck and vertical walls and curbs, as shown. Miter corners evenly.
- 5. Metal Flashings:
 - a. General: Fabricate and install per Section 07 60 00 - FLASHING AND SHEET METAL, as shown and per manufacturer's recommendations.
 - b. Base Flashing: Extend up vertical surfaces 6 inches, minimum, and onto the horizontal roof surfaces not less than 5-1/2 inches, unless otherwise shown.
 - c. Roof Jack at Plumbing Vents, Drains and Accessories: Install as shown, per manufacturer's instructions.
- 6. Application:
 - a. General: Unroll over prepared substrate; mechanically fasten at perimeter, corners and field. Lap adjoining sheets 5-1/2 inches and splices 1-1/2 inches, minimum. Cover mechanically fastened discs and top edges of roofing sheet seams.
 - b. Parapet Wall Covering: Install as shown, extend to full height of parapet; lap under parapet cap flashing and extend down outside wall 2 inches, minimum. Secure in place to assure a completely watertight installation.
 - c. Walkway: Per manufacturer's instructions and as shown.
- 7. Fasteners: Per manufacturer's recommendation; fastening length and pattern based on performance values supplied by the fastener manufacturer and conforming to Factory Mutual fastening pattern.

- C. FIELD QUALITY CONTROL: Apply roofing materials when manufacturer's representative and Architect are present.

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FLASHING AND SHEET METAL

Section 07 60 00

1. GENERAL:

- A. SUMMARY: Provide Flashing and Sheet Metal, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. National Association of Architectural Metal Manufacturers (NAAMM): Metal Finishes Manual for Architectural and Metal Products.
 - 3. National Roofing Contractors Association (NRCA):
 - a. General: NRCA Roofing and Waterproofing Manual.
 - b. Sheet Metal: NRCA Architectural Sheet Metal and Metal Roofing Manual.
 - 4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
 - 5. Specialty Steel Industry of North America (SSINA): Finishes for Stainless Steel.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit guarantee in required form for a period of two (2) years from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Sheet Material:
 - a. Galvanized Sheet Metal:
 - 1. General: ASTM A653; 24 gage minimum, core steel.
 - 2. TPO Coated: Coat all sheet metal in contact with PVC roofing membrane as specified in Section 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING.
 - b. Stainless Steel: ASTM A167 and ASTM A666, type 304, with SSINA No. 4 finish, 18 gage; size and shape as shown.
 - 2. Underlayment:
 - a. General: ASTM D2626, 15 lb. asphalt saturated roofing felt, unperforated.
 - b. Self Sealing Underlayment:
 - 1. General: Rain-Proof High Performance Roof Underlayment manufactured by Protecto Wrap Co.
 - 2. Alternate Manufacturers: Comparable products manufactured by Grace Construction Products, or accepted equal.
 - 3. Primer: As recommended by manufacturer.
 - 3. Fasteners:
 - a. General: Same metal as sheet metal flashing or other non-corrosive metal as recommended by sheet metal manufacturer, designed to withstand design loads. Match finish of exposed heads with material being fastened.
 - b. Nails:
 - 1. General: FS FF-N-105; same material and finish as flashing metal.
 - 2. Steel: Hot-dipped galvanized, annular thread, size as required.
 - 3. Concrete: Flat head, size as required.
 - c. Screws: Stainless steel self tapping type, size as required.
 - d. Rivets: 1/8 inch diameter, solid type; rust resistive.
 - e. Washers: Neoprene, where required.
 - 4. Solder:
 - a. General: ASTM B32; 50/50 type; lead free.
 - b. Flux: FS O-F-506.
 - c. Stainless Steel: ASTM B32, Grade Sn60; use with acid flux type as recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux for tinned surfaces.
 - 5. Finishes:
 - a. Galvanizing Repair Treatment:
 - 1. Rod: Per ASTM A780.
 - 2. Coating: Per MIL-P-46105.
 - b. Protective Coatings:
 - 1. General: FS TT-C-494, Type II; bituminous.
 - 2. Backing Paint: Zinc chromate, alkyd.
 - 6. Plastic Cement: ASTM D2822, asphalt type.
 - 7. Sealing Tape: Refer to Section 07 92 10 - JOINT SEALERS.

8. Sealants: FS TT-S-230, non-hardening, non-sagging; refer to Section 07 92 10 - JOINT SEALERS.

B. FABRICATION:

1. Manufacture:
 - a. General: Fabricate and assemble sheet metal work in shop; field fabricate only when required by restrictive field conditions. Form sections, per referenced standards, true to shape, accurate in size, square, and free from distortion or defects. Form pieces in single length sheets, not to exceed 10'-0" in length. Hem exposed edges on underside 1/2 inch; miter and seam corners.
 - b. Seams: Flat lock.
 - c. Corners: One piece with minimum 18 inch long legs; solder for rigidity, seal with sealant.
 - d. Cleats: Minimum 2 inches wide, interlockable with sheet.
 - e. Vertical Faces: Bottom edge formed outward 1/4 inch and hemmed to form drip.
 - f. Flashing Toe: Extend toe 2 inches over roofing; return and brake edges.
 - g. Soldering: Solder shop-formed metal joints. After soldering, remove flux; wipe and wash solder joints clean. Weather seal joints.
 - h. Back Painting: Paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.
2. Assemblies:
 - a. General: Fabricate with galvanized sheet metal, unless otherwise shown.
 - b. Flashing:
 1. General: Fabricate as shown.
 2. Parapet Caps and Closures: Provide parapet caps, other caps and closures as required; 20 gage; size as shown.
 3. Exterior Hollow Metal Frame Flashing: 18 gage, as shown.
 - c. Countertops:
 1. Galvanized Steel Workbench: One piece construction, front to back; 14 gage, size as shown.
 2. Stainless Steel Countertops:
 - (a) General: ASTM A167 and ASTM A666, type 304, 14 gage monolithic counters and backsplashes, all welded construction ground smooth to a uniform finish; size as shown.
 - (b) Stainless Steel Decontamination Sink/Counter: ASTM A167 and ASTM A666, type 304, 14 gage 1-piece, with dual sinks with knife edge at center; as shown.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects.
2. Measurements: Take field measurements; report variance between plan and field dimensions.
3. Storage: Stack preformed material to prevent twisting, bending or abrasion; slope to ensure drainage.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Underlayment:
 - a. General: Apply one (1) layer of felt underlayment over surfaces as shown; lap all edges 6 inches minimum, in direction of slope.
 - b. Self Sealing Underlayment:
 1. General: Apply under flashings at horizontal surfaces and surfaces up to 30 degrees from horizontal. Clean and prepare surfaces as recommended by manufacturer.
 2. Application: Install as shown, per manufacturers instructions. Roll surface to remove wrinkles and assure adhesion.
3. Application:
 - a. General: Make corners square, surfaces true and straight in planes, and lines accurate to profiles. Fit sheet metal tight in place; secure using concealed fasteners. Apply plastic cement compound between metal flashings and felt flashings. Seal metal joints watertight.
 - b. Expansion and Contraction: Allow for expansion and contraction over an ambient temperature range up to 150 degrees F; distortions resulting from fastening or expansion and contraction stresses not acceptable.
 - c. Dissimilar Metals: Isolate with heavy coat of bituminous paint. Coat all sheet metal in contact with roofing felts.
4. Assemblies:
 - a. Flashing:
 1. General: Install flashings where shown; miter and solder joints at corners. Lap joints in counterflashing at least 6 inches and make watertight with sealing tape. Extend counterflashing down not less than 6 inches.

2. Parapet Caps and Closures: Install miscellaneous caps and closures as required and as shown. At parapet caps provide 1/2 inch per foot slope to the inside of building; install blocking as required.
 3. Exterior Hollow Metal Frame Flashing: Provide at frame heads, as shown.
 - b. Countertops: Install over plywood backing as shown; secure metal to wood with screws on underside of counter. Lay countertops tightly, without waves or buckles.
 5. Sealants: As shown; set pan and base flashings in full bed of sealant.
 6. Galvanizing Repair Treatment: Repair damaged zinc coating with specified repair compound, as required.
- C. FIELD QUALITY CONTROL: Leaking, failure to stay in place, undue expansion, lifting deformation, loosening, buckling, tearing and splitting of seams will be considered defective work; make necessary corrections.

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SELF-ADHERED SHEET FLASHING

Section 07 65 26

1. GENERAL:

- A. SUMMARY: Provide Self-Adhered Sheet Flashing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C920: Standard Specification for Elastomeric Joint Sealants.
 - c. ASTM C1193: Standard Guide for Use of Joint Sealants.
 - d. ASTM D882: Test Method for Tensile Properties of Thin Plastic Sheeting.
 - e. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.
 - f. ASTM E96: Test Method for Water Vapor Transmission of Materials.
 - g. ASTM E1677: Specification for Air Retarder Material or System for Framed Building Walls
 - h. ASTM E2178: Test Method for Air Permeance of Building Materials.
 - i. ASTM E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
 - 2. American Association of Textile Chemists and Colorists (AATCC): Test Method 127 Water Resistance - Hydrostatic Pressure Test.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Closeout: Submit guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 - 2. Self-Adhered Sheet Flashing:
 - a. General: Products manufactured by DuPont Tyvek Weatherization Systems.
 - b. Alternate Manufacturers: Comparable products manufactured by Raven Engineered Films, or approved equal.
 - c. Weather Barrier Membrane: DuPont Tyvek CommercialWrap.
 - d. Seam Tape: DuPont Tyvek Flashing Tape.
 - e. Flashing: DuPont FlexWrap NF and StraightFlash, where shown.
 - 3. Fasteners: As recommended by manufacturer.
 - 4. Sealant: As recommended by manufacturer..

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Review requirements for sequencing of application with installation of windows, doors, louvers and flashings to provide a weather-tight assembly.
 - 2. Environmental Requirements: Do not install during inclement conditions.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.
 - 4. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Application: Install at exterior door and window openings as shown.

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GARDEN ROOF DECK SYSTEM

Section 07 76 53

1. GENERAL:

- A. SUMMARY: Provide Garden Roof Deck Assembly, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American National Standards Institute (ANSI): ANSI Z60.1 - American Standard for Nursery Stock.
 - 3. German Landscape Development and Research Society (FLL): Guidelines for Planning, Execution and Upkeep of Green-Roof Sites"
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings including anchorage details and calculations.
 - 2. Samples: If specifically requested.
 - 3. Certificates: Certify that membrane meets or exceeds specified requirements.
 - 4. Closeout:
 - a. General: Submit maintenance data.
 - b. Guarantee:
 - 1. General: Provide in required form as follows:
 - 2. Modules: Provide for a period of twenty (20) years from date of final acceptance by City.
 - 3. Extended Plant Warranty: Provide for a period of one (1) years from date of final acceptance by City.
 - c. Maintenance Period:
 - 1. General: Maintain the planted modules for a period of at least six (6) months after completion prior to acceptance by City.
 - 2. Six (6) Month Maintenance:
 - a) General: Repair, rework, and replant areas that have washed out or are eroded. Replace dead plants with new plants.
 - b) Watering: Water the roof deck system once a week (weather dependent) too aid in plant establishment. System shall be watered more frequently during extended hot and dry weather especially when plants are showing signs of wilting.
 - c) Weeding: Perform spot weeding as necessary.
 - 3. Acceptance:
 - a) General: Modules and planting in acceptable condition, maintenance period requirements have been complied with, and healthy, even colored viable plants are established.
 - b) Maintenance Plan: Upon completion of the six (6) month maintenance period, submit a written maintenance plan for the specific green roof system.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Garden Roof Deck Assembly:
 - a. General: GreenGrid Green Roof System manufactured by GreenGrid Roofs.
 - b. Alternate Manufacturers: No known equal.
 - c. Modules: 24 inch x 24 inch x 4inch and 24 inch x 48 inch x 4inch Extensive Standard Modules.
 - d. Edge Treatments: Manufacturer's standard aluminum or steel.
 - e. Rubber Pavers: Manufacturer's standard, color selected by the Architect.
 - f. Growth Media: GreenGrid Growth Media.
 - g. Vegetation: As shown on "PlantingPlan".
- B. FABRICATION:
 - 1. Growth Media: Prepare per manufacturer's directions.
 - 2. Soil Conditioners: Refer to Section 32 90 00 - PLANTING for specific plant type requirements.
 - 3. Planting: Refer to Section 32 90 00 - PLANTING; supply vegetation in minimum 2 inch deep by 1-1/2 inch wide (plugs) and plant 4 to 6 inches on center (18 to 16 plants per 2x4 module, respectively). Pre-plant and pre-grow to 90 % coverage with specified vegetation.

3. EXECUTION:

- A. PREPARATION:
 - 1. Pre-installation Job-Site Conference: Scheduled by installer with one week advance notice to discuss requirements of related work surface preparation, storage and handling, protection measures, materials and application specifications.

2. Scheduling: Install between April 15 and October 15 and as directed by the Landscape Architect. Coordinate the completion of installation within a 24-hour period from the time the modules are delivered to the site.
 3. Environmental Requirements: Do not install during excessively hot periods or when the temperature will fall below 50°F.
 4. Examination:
 - a. General: Examine conditions of work in place before beginning work; report defects. Verify substrate is watertight and ready for planting installation.
 - b. Waterproofing System: Refer to Section 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING.
 - c. Flashing and Counterflashing: Refer to Section 07 60 00 - FLASHING AND SHEET METAL.
 5. Measurements: Take field measurements; report variance between plan and field dimensions.
 6. Delivery and Storage:
 7. Protection: Deliver module to site complete with pre-planted growth media.
 - a. General: Protect existing construction, work of other trades, and other improvements.
 - b. Planting: Protect landscape work and materials from damage by other trades and by the public. Maintain protection during installation and maintenance periods.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Slip Sheet: Install as recommended by manufacturer.
 3. Modules: Place modules over the slip-sheet as shown, in straight rows, tight against each other, arranged in the proper directional orientation and connect with zip ties as recommended by the manufacturer.
 4. Irrigation: Refer to Section 32 84 00 - PLANTING IRRIGATION; irrigate planted area as recommended by manufacturer.
 5. Planting: Refer to Section 32 90 00 - PLANTING; supply vegetation in minimum 2 inch deep by 1-1/2 inch wide (plugs) and plant 4 to 6 inches on center (18 to 16 plants per 2x4 module, respectively).

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APPLIED FIREPROOFING

Section 07 81 00

1. GENERAL:

- A. SUMMARY: Provide Applied Fireproofing, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. California Occupational Safety and Health Administration (CalOSHA): Regulation 29 C.F.R. Section 1926.58 regulating the use of asbestos in construction.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Test Reports: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - 3. Certificates:
 - a. General: Submit manufacturer's certificate stating that products meet or exceed specified requirements.
 - b. Compliance: Provide certificate of compliance for fireproofing materials to Agency having jurisdiction indicating approval for use on this Project.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of five (5) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.
 - 2. Testing:
 - a. General: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - b. Procedures: UL fire resistance per ASTM E119; time-temperature criteria and unrestrained condition as defined by CBC.
 - c. Retesting: Paid for by Contractor.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Applied Fireproofing:
 - a. General: Monokote MK-6 GF, mill-mixed, asbestos-free fiber type; manufactured by Grace Construction Products.
 - b. Alternate Manufacturers: Comparable products manufactured by Southwest Vermiculite Co., Inc., or accepted equal.
 - c. Classification: Comply with UL Fire Hazard Classifications for assemblies as shown.
 - 3. Primer Adhesive: Manufacturer's standard.
 - 4. Metal Lath: Expanded metal lath weighing not less than 3.4 lbs. per foot yard, coated with rust inhibitive primer.
 - 5. Protective Sealer: SprayDon Sealer.
 - 6. Cementitious Overcoat: Lightweight gypsum plaster; ASTM C35, perlite aggregate, ready-mixed, spray applied.
 - 7. Water: Clean and potable, free of deleterious material.
- B. MIXES:
 - 1. Fireproofing:
 - a. General: Mix materials per manufacturer's directions in clean machine mixers, free of matter from previous batch. Do not use frozen, caked or lumpy material, or material that is partly set.
 - b. Equipment: Use mixing and application equipment conforming to recommendations of fireproofing manufacturer.
 - 2. Protective Sealer: One part water; one part sealer.
 - 3. Cementitious Overcoat: Mix with water to a pumpable consistency for spray application.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Do not apply until hangers, clips, inserts and other attachments are installed. Apply fireproofing prior to installation of ducts, piping, conduit and other work that will prevent application to required thickness.
 - 2. Environmental Requirements: Minimum application temperature 40 degrees F; 2011/11/11

- manufacturer's recommended temperature and ventilation requirements during drying period.
3. Examination: Examine conditions of work in place before beginning work; report defects.
 4. Delivery:
 - a. General: Materials are to be received in the manufacturer's original, unopened packages; remove from the site any packages damaged, torn, not clearly marked or with marks not legible.
 - b. Storage: Store materials off the ground and in a dry and well ventilated place.
 5. Protection: Protect adjacent surfaces from overspray; prevent fireproofing material from entering mechanical equipment and ductwork. Provide fabric enclosure to confine material from blowing and drifting into adjacent areas. Provide adequate ventilation of enclosure with exterior air.
 6. Surface Preparation: Clean metal surfaces of dirt, dust, grease, oil, rust and other foreign matter which may prevent adhesion.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Application:
 - a. General: Apply in one or more coats; thickness as required for fire resistance rating shown.
 - b. Metal Lath: Provide where shown.
 - c. Primer Adhesive: Apply per manufacturer's directions.
 - d. Thickness: Thickness of fireproofing, including cementitious overcoat, is based on unrestrained assemblies and temperature rise of protected members or surfaces, and not on loss of strength.
 - e. Finish: Under gun.
 - f. Work Damaged by Weather: Remove and replace as required, at no additional cost to the City.
 - g. Cutting and Patching: Do not remove fireproofing without prior approval. Where fireproofing has been damaged or removed by other trades, perform patching and repairs as required to restore to original thickness. Cost of patching shall be the responsibility of trade causing the damage.
- C. FIELD QUALITY CONTROL:
1. Field Testing:
 - a. General: Provide material required for testing at Contractor's expense. Measuring devices, such as containers for samples and depth gage, provided by testing agency.
 - b. Dry Density:
 1. Samples: Fill sample containers from nozzle. Use containers large enough to make blocks from which nine (9) 2 inch square cubes can be cut; one (1) sample per floor.
 2. Procedure: Approximately two (2) hours after initial set remove sample from container; allow to air dry at least one (1) week or until sample can be sawn into cubes without tearing. Accurately cut sample into 2 inch square cube; dry in a circulating oven at 120 degrees F. and 17 percent relative humidity until cubes reach a constant weight. Select six (6) undamaged cubes, without voids; use to determine average weight and ultimate density of sample.
 3. Density Requirements: 15.0 per cubic foot minimum, for cementitious material.
 4. Defective Material: Remove or repair all non-conforming material at no expense to the City.
 - c. Thickness:
 1. Number of Tests: Measured during each day's application of final coat; at undetermined intervals and areas.
 2. Method of Test: By depth gage; recoat areas where average thickness is less than required minimum. Recoated areas will be rechecked for proper thickness.

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FIRESTOPPING

Section 07 84 00

1. GENERAL:

- A. SUMMARY: Provide Firestopping, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.
 - c. ASTM E119: Method for Fire Tests of Building Construction and Materials.
 - d. ASTM E814: Test Method of Fire Tests of Through-Penetration Firestops.
 - 2. International Firestop Council (IFC): Guidelines for Evaluating Firestop Systems Engineering Judgements.
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. Fire Resistance Directory:
 - 1. BXUV: Fire Resistance Ratings.
 - 2. XHCR: Through-penetration Firestop Devices.
 - 3. XHEZ: Through-penetration Firestop Devices.
 - 4. XHHW: Fill, Void and Cavity Material.
 - 5. XHKU: Forming Materials.
 - b. UL-1479: Fire Tests of Through-Penetration Firestops.
 - c. UL-2079: Tests for Resistance of Building Joint Systems.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Shop Drawings: Submit manufacture and installation details, including proposed material, approved systems, reinforcement, anchorage, fastenings, and procedures for installation reflecting actual conditions, for review.
 - 3. Certificates: Manufacturer shall certify that products meet or exceed specified requirements for fire rating for assemblies penetrated.
 - 4. Closeout: Submit guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Single Source Responsibility: Provide a complete UL listed firestop system of a single manufacturer only. Combinations of multiple manufacturers' products not allowed.
 - 2. Installer: Specializing in the work of this Section with minimum five (5) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Firestopping:
 - a. General: Manufactured by Hilti, Inc..
 - b. Alternate Manufacturers: Comparable products manufactured by 3M Fire Protection Products, or accepted equal.
 - 3. Cast-in place: CP 680 Cast-In Firestop Devices; type as recommended by manufacturer.
 - 4. Intumescent Fire Blocks:
 - a. Collars: CP 643N or CP 644 Firestop Collar.
 - b. Metal Deck: CP 777 Speed Plugs; size as required.
 - 5. Mortar: CP 637 Firestop Mortar.
 - 6. Foam: CP 620 Fire Foam.
 - 7. Primer: As recommended by manufacturer.
 - 8. Sealants:
 - a. Intumescent: FS-ONE Intumescent Firestop Sealant.
 - b. Flexible: CP 606 Flexible Firestop Sealant.
 - 9. Putty: CP 618 Putty Stick.
 - 10. Spray: CP 672 Firestop Spray.
 - 11. Fasteners:
 - a. Retainers: Manufacturer's standard clips to support mineral fiber matting.
 - b. Masking Tape: Pressure sensitive adhesive tape recommended by manufacturer.
 - 12. Accessories: As recommended by the manufacturer for the condition and fire rating shown.

13. Dam Material:
 - a. General: Permanent or removable as recommended by sealant manufacturer.
 - b. Safing Insulation: Mineral fiber; unfaced; thickness as shown.
 - c. Mineral Fiberboard: Mineral fiber fireproofing, unfaced; thickness as shown.
 - d. Intumescent Coated Mineral Wool Strips: CP 648S Wrap Strips; type as recommended by sealant manufacturer.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Sequence work to permit firestopping materials to be installed after adjacent and surrounding work is complete.
2. Environmental Requirements: Do not apply materials when temperature is below 60 degrees F; maintain minimum temperature before, during, and for three (3) days after installation.
3. Examination: Examine conditions of work in place before beginning work; report defects.
4. Surface Preparation: Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Fire Ratings: As shown.
3. Dam Materials: Install as backing to arrest liquid material leakage; remove after firestopping material has cured.
4. Primer: Where required; per manufacturer's instructions.
5. Firestopping: Install material at floors, walls, partitions, ceilings and other openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping to thickness needed for the fire rating required.

* * *

JOINT SEALERS

Section 07 92 10

1. GENERAL:

- A. SUMMARY: Provide Joint Sealers, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C1472: Standard Guide for Calculating Movement and Other Effects When Establishing Sealant Joint Width.
 - 2. Sealant, Waterproofing and Restoration Institute (SWRI): Sealants: The Professional's Guide.
- C. SUBMITTALS:
 - 1. General: Submit product data, samples, and certification that sealants proposed for use comply with the Contract Documents.
 - 2. Certifications: Submit SWRI Liquid Sealant Validation for all liquid products.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of ten (10) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications:
 - a. General: The manufacturer of the sealant used shall have been in the business of manufacturing the specified types of such sealants for not less than 10 years.
 - b. Applicator: Installer specializing in the work of this Section with minimum five (5) years documented experience.
 - c. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by Federal and State EPA regulations.
 - 2. Compatibility with Substrate: Verify that caulking and sealants used are compatible with joint materials.
 - 3. Joint Tolerances: Comply with manufacturer's joint width/depth ratio limitations.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Joint Sealers:
 - a. General: Manufactured by Tremco, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the Pecora Chemical Corp., or accepted equal.
 - c. Color:
 - 1. Concealed Joints: Manufacturer's standard color as selected by the Architect having best overall performance characteristics for indicated application.
 - 2. Exposed Joints: Custom color selected by Architect.
 - 3. Exterior Joints:
 - a. Vertical Surfaces: Non-sag polyurethane; Dymonic FC.
 - b. Sealing Tape: TremGlaze GT400 Tape.
 - c. Exterior and Interior Horizontal Paving Joints: THC 900 self-leveling polyurethane.
 - 4. Interior Joints:
 - a. General: Acrylic Latex, TremGlaze SA1100.
 - b. Ceramic Tile and Plumbing Fixture Joints: Proglaze silicone rubber.
 - c. Sound Transmission: Tremco Acoustical Sealant.
 - d. Firestop Caulking: Refer to Section 07 84 00 - FIRESTOPPING.
 - 5. Joint Cleaner: Provide cleaner recommended by sealant manufacturer for specific joint surface and condition.
 - 6. Joint Primer and Sealer: Non-corrosive and non-staining type as recommended by sealant manufacturer for each condition.
 - 7. Joint Backing: Round, open cell non-gassing polyurethane foam rod or closed cell polyethylene foam as recommended by the manufacturer, oversized 30 percent larger than joint width.
 - 8. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.
 - 9. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
 - 10. Other Materials: Manufacturer's standard for items required or type best suited for proper execution of the work.

3. EXECUTION:

A. PREPARATION:

1. Environmental Requirements: Do not apply materials when temperature is below 40 degrees F, or under extreme temperature conditions when joint width is expanded or contracted beyond normal conditions.
2. Examination:
 - a. General: Carefully examine before beginning work; report defects.
 - b. Substrate: Inspect surfaces to ensure that no previously installed bond-breaker materials contaminate the surface to which the sealant is to adhere. Require repair of unsound substrates. Commencement of work constitutes acceptance of substrate.
3. Storage: Per manufacturer's recommendations for proper precautions for shelf life, temperature, humidity and similar storage factors to ensure the fitness of the material when installed.
4. Surface Preparation:
 - a. General: Prepare joints in accordance with manufacturer's instructions to ensure maximum adhesion. Remove loose materials and foreign matter that might impair adhesion of sealant.
 - b. Masking: Tape as required to prevent contact of sealant with adjoining surfaces to prevent permanent staining, damage by contact, or by cleaning methods required to remove sealant smears.
 - c. Sealants: Prepare as required, including proper mixing of multi-component sealants.
5. Protection: Protect surfaces adjacent to joints to receive sealant. Cover joints in walking surfaces with heavy duty, non-staining tape, until material has dried.

B. APPLICATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Joints: Review joint size and movement per ASTM C1472.
3. Installation:
 - a. General: Install per manufacturer's instructions, within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within recommended ranges.
 - b. Joint Cleaner: Apply per manufacturer's instructions.
 - c. Primer: Apply as required; protect adjacent exposed surfaces.
 - d. Backing: Install to achieve a neck dimension no greater than 1/3 of the joint width, unless otherwise shown. Use blunt or rounded tools to ensure uniform (+ or - 1/8 inch) depth without puncturing material. Use oversize backer rod; minimum of 33% for closed cell type; minimum of 50 percent for open cell type, unless otherwise required by the manufacturer.
 - e. Bond Breaker: Install where joint backing is not used.
 - f. Sealant: Install free of air pockets, foreign embedded matter, ridges, and sags; prevent three sided adhesion. Measure joint dimensions and size materials to achieve required 2:1 width/depth ratios, unless otherwise noted. Provide sealant depth of one half (1/2) joint width; minimum depth of 1/4 inch; maximum of 1/2 inch, unless otherwise required by the manufacturer.
 - g. Sound Transmission: Install sealant per manufacturer's instructions to obtain STC Values shown.
 - h. Firestopping: Apply as required to comply with fire ratings shown.
 - i. Masking: Remove tape immediately after tooling without disturbing joint seal.

* End Division 07 *

Division 08 - OPENINGS

STEEL DOORS AND FRAMES

Section 08 11 10

1. GENERAL:

- A. SUMMARY: Provide Steel Doors and Frames, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American National Standards Institute (ANSI):
 - a. ANSI A117.1: Accessible and Usable Buildings and Facilities.
 - b. ANSI A250.8: Recommended Specifications for Standard Steel Doors and Frames.
 - 3. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 - 4. Door Hardware Institute (DHI): Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
 - 5. Intertek Testing Services (ITS): Certification listings for fire doors.
 - 6. Steel Door Institute (SDI):
 - a. ANSI/SDI-250.6: Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
 - b. ANSI/SDI-250.8: Recommended Specification for Standard Steel Doors and Frames
 - c. ANSI/SDI-250.11: Recommended Erection Instructions for Steel Frames.
 - 7. Underwriters Laboratories, Inc. (UL): UL 10C - Positive Pressure Fire Tests of Door Assemblies.
- C. SUBMITTALS:
 - 1. General: Submit product data, and samples.
 - 2. Shop Drawings: Show details of each condition shown at 3 inch scale.
 - 3. Test Reports: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Labeled Doors and Frames: Conform to requirements of State Fire Marshal and Underwriters Laboratory.
 - 2. Design Requirements: Exterior glazed frame members designed to withstand a wind load of 24 lbs. per square foot, minimum.
 - 3. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Steel:
 - a. Sheet: ASTM A1008 and ASTM A1011, uncoated, pickled, and free from pits and defects. Use cold-rolled or hot-rolled for frames; stretcher-leveled for 18 gage and lighter.
 - b. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A653, commercial quality.
 - c. Reinforcement: ASTM A36.
 - 2. Fasteners:
 - a. General: Galvanized or cadmium plated.
 - b. Bolts and Nuts: ASTM A307, Grade A.
 - c. Machine Screws: FS FF-S-92, Type III cross-recessed, Design I or II recess, Style 2c flat head; carbon steel.
 - 3. Sound Deadening: Fibered asphalt emulsion.
 - 4. Silencers: Resilient rubber; manufacturer's standard.
 - 5. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.
 - 6. Primer: Refer to Section 09 91 00 - PAINTING.
- B. MANUFACTURE:
 - 1. General: Specified products are manufactured by Ceco Door Products, unless otherwise noted.
 - 2. Alternate Manufacturers: Comparable products manufactured by the Kewanee Corp., or accepted equal.
 - 3. Hardware Requirements: Prepare doors and frames at factory to receive template hardware per

final schedule; locate as specified under Section 08 71 00 - DOOR HARDWARE. Provide reinforcements of specified thicknesses and sizes recommended by hardware manufacturer; hinge reinforcements not less than 7 gage and at least 9 inches long; mortised and countersunk items not less than 12 gage; surface applied items not less than 14 gage; other reinforcing per ANSI A250.6.

4. Metal Doors:
 - a. General:
 1. Exterior (Non-thermally Broken): SDI-100 Level II, Model 1.
 2. Exterior (Thermally Broken): SDI-100 Level II, Model 2.
 3. Interior (Non-rated): SDI-100 Level II, Model 1.
 4. Interior (Fire Rated): SDI-100 Level II, Model 2.
 5. Interior (Acoustic): SDI-100 Level II, Model 2.
 - b. Door Construction:
 1. Face: Steel sheet in accordance with ANSI A250.8.
 2. Core:
 - a) Unrated: Manufacturer's standard.
 - b) Composite: For fire rating, as shown.
 - c) Thermal Insulated: Total insulation R value of 11, measured in accordance with ASTM C1363 under ASTM C1199.
 - d) Sound Rated: STC of 50, measured in accordance with ASTM E413.
 5. Metal Frames:
 - a. Exterior: 16 gage; 14 gage for frames **over** 3'-0" wide.
 - b. Interior Frames: 18 gage; 16 gage for frames **over** 3'-0" wide or fire rated.
 - c. Sound Deadening: Apply thick coat to inside of frames.
 6. Finish: Baked primer.
- C. FABRICATION:
1. Metal Doors:
 - a. General: Fabricate to sizes and shapes shown.
 - b. Flush Doors: Fabricate doors with hardware reinforcement welded in place. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.
 - c. Fire Rated Doors: Permanently attach fire rating label to each door unit.
 - d. Door Clearances: Provide 1/8 inch maximum clearance at jambs, heads, and meeting stiles; threshold clearances as specified under Section 08 71 00 - DOOR HARDWARE.
 - e. Electrical Requirements: Make provisions for installation of electrical items specified under Section 08 71 00 - DOOR HARDWARE and other applicable Sections.
 2. Metal Frames:
 - a. Standard Frames: Fabricate frames as welded unit.
 - b. Fire Rated Frames: Fabricate as specified for standard metal frames; permanently attach fire rating label to frame.
 - c. Reinforcement:
 1. General: Reinforce frames wider than 48 inches with roll-formed steel channels fitted tightly into frame head, flush with top.
 2. Hardware: Fabricate frames with reinforcing plates welded in place. Provide mortar guard boxes, where required.
 - d. Stops:
 3. Anchors:
 - a. General: Fabricate 16 gage x 2 inch wide anchors of same material used for door frames.
 - b. Metal Stud Partitions: Metal stud type anchors.
 - c. Masonry: Tee shaped anchors at least 10 inches long, corrugated or perforated; adjustable type.
 - d. Concrete: Tee shaped anchors at least 10 inches long, corrugated or perforated.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects.
2. Measurements: Take field measurements; report variance between plan and field dimensions.
3. Protection: Protect metal surfaces after installation; any indication of deterioration, use or damage will be unacceptable.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Fire Rated Openings: As shown; make manufacturer's installation instructions available to inspecting authorities.

3. Anchors:
 - a. Jambs:
 1. General: Position one (1) anchor above top butt reinforcement and one (1) anchor below bottom butt reinforcement; minimum four (4) anchors per door jamb, 24 inches on center maximum.
 2. Frames Set in Metal Stud Partitions:
 - a) General: Weld to frames and studs.
 - b) 25 Gage Studs: Fasten to studs with sheet metal screws per anchor manufacturer's recommendations.
 3. Frames Set in Masonry: Friction fit to frames prior to placement.
 4. Frames Set in Concrete: Weld to frames prior to placement.
 - b. Head: Provide minimum of two (2) anchors at frames over 2'-6" wide; 24 inches on center, maximum.
 4. Metal Frames:
 - a. General: Set frames plumb, straight and square; align and securely brace until permanent anchors are set; use shims where required. Remove temporary braces after wall construction is completed.
 - b. Door Frames: Where shown, provide overhead frame bracing; securely anchor to structure. Install roll-formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
 - c. Sealant: Seal perimeter of frames and adjoining material per Section 07 92 10 - JOINT SEALERS.
 5. Metal Doors:
 - a. General: Match doors into their respective frames; install plumb, straight and square.
 - b. Hardware: Refer to Section 08 71 00 - DOOR HARDWARE.
 - c. Maximum Diagonal Distortion: 1/8 inch measured with straight-edge, corner to corner.
 6. Finish: Touch-up factory applied baked primer; refer to Section 09 91 00 - PAINTING.
- C. ADJUSTMENT: Prior to acceptance, adjust moveable parts to assure smooth operation.

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FLUSH WOOD DOORS

Section 08 14 16

1. GENERAL:

- A. SUMMARY: Provide Flush Wood Doors, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Intertek Testing Services (ITS): Certification listings for fire doors.
 - 2. Window and Door Manufacturers Association (WDMA): WDMA I.S. 1A: Architectural Wood Flush Doors.
 - 3. Underwriters Laboratories, Inc. (UL): UL 10C - Fire Tests of Door Assemblies.
 - 4. Woodwork Institute (WI): Architectural Woodwork Standards (AWS); Section 9 - Doors.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Certificates:
 - a. General: Submit WI Certified Compliance Certificate for Installation.
 - b. Hardwood:
 - 1. General: Submit certification and documentation verifying that hardwood lumber and veneers were obtained from sustainably managed sources and that certified lumber was properly segregated from other materials while in storage and production.
 - 2. Acceptable Certifying Agencies:
 - a) Rainforest Alliance (RA): "Smart Wood Program".
 - b) Scientific Certification Systems (SCS): Forest Stewardship Council (FSC) "Forest Conservation Program".
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Labeled Doors: Conform to requirements of State Fire Marshal Standard 12-7-4 and Underwriters Laboratory for labeled wood doors in fire-rated openings.
 - 2. Testing: One (1) or more doors, of each type, may be selected at random from those delivered for testing. Those tested or cut apart will be used to determine compliance with specified requirements; noncompliance is basis for rejection of all of that kind and type of door delivered to the site. Acceptable doors used for testing will be replaced at City's expense.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. Certified Wood Products: Use only Forest Stewardship Council (FSC) certified wood products from acceptable FSC sources with Chain of Custody (CoC) documentation and number.
 - b. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36.
 - 2. Flush Wood Doors:
 - a. General: Conform to Premium Grade standards, per AWS Section 9 - Doors.
 - b. Manufacture:
 - 1. General: Signature Series - Environmental Class Doors manufactured by Marshfield Door Systems, Inc.
 - 2. Alternate Manufacturers: Comparable products manufactured by Algoma Hardwoods, Inc., or accepted equal.
 - c. Flush Type:
 - 1. Interior: 1-3/4 inch thick.
 - a) Construction:
 - 1) Solid Core:
 - a) Unrated and 20 Minute: FSC staved.
 - b) Fire Rated: Mineral core; 45 and 60 minute.
 - c) Acoustical: Signature Series Sound Retardant Doors; STC rating as shown.
 - 2) Edge-bands: WDMA hardwood.
 - b) Facing: American Elm.
 - c) Adhesive: PS 51 Type I and II.
 - d. Accessories:
 - 1. General: Manufactured by the Air Louvers, Inc.
 - 2. Alternate Manufacturers: Comparable products manufactured by Anemostat Door Products, a Mestek Company, or accepted equal.

3. Louvers: Model No. 900; fire rated as shown.
4. Vision Light Frames: Model No. VLF; glass and glazing per Section 08 81 00 - GLASS GLAZING, as shown.
5. Fasteners: Manufacturer's standard; tamperproof.
- e. Finish: Manufacturer's standard WDMA I.S. 1A finish; color as selected by Architect. Provide additional coat of finish on face of interior doors.
3. Hardware Requirements: Prepare doors at factory to receive template hardware per final schedule; locate as specified under Section 08 71 00 - DOOR HARDWARE. Provide reinforcements of specified thicknesses and sizes recommended by hardware manufacturer and per ANSI A250.6.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects. Verify that door frames are the type required for door and are properly installed. Install fire rated doors only in corresponding fire rated frames.
2. Measurements: Take field measurements; report variance between plan and field dimensions.
3. Delivery:
 - a. General: Pack and protect doors against damage during shipment and storage. Do not use packing materials that will stain or discolor door surface.
 - b. Storage: Per WI Technical Bulletin No. 420-R for flush doors and No. 416-R for fire rated doors. Store materials under cover, in heated rooms and protected from damage, including exposure to excess humidity.

B. INSTALLATION:

1. General: Install in strict conformance with CBC, other referenced standards, the manufacturer's written directions, as shown, and as herein specified. Make manufacturer's instructions available to the inspecting authorities.
2. Door Types: Install where shown.
3. Tolerances:
 - a. General: Maximum distortion measured with straight edge or taut string, corner to corner, over an imaginary 36 inch x 84 inch surface area.
 - b. Diagonal (Warp), Vertical (Bow) and Width (Cup): 1/8 inch.
4. Hardware: Per Section 08 71 00 - DOOR HARDWARE. Fit doors to specified clearances; do not trim job fitted doors more than 1/4 inch from any edge.
5. Glazing: Per Section 08 81 00 - GLASS GLAZING.

C. ADJUSTMENT: Prior to acceptance, adjust moveable parts to assure smooth operation.

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ACCESS DOORS AND PANELS

Section 08 31 00

1. GENERAL:

- A. SUMMARY: Provide Access Doors and Panels, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Access Panels:
 - a. General: Steel frame with continuous hinge, manufactured by Milcor Inc.; sizes as shown.
 - b. Alternate Manufacturers: Comparable products manufactured by Samson Products Inc., or accepted equal.
 - c. Wall and Ceiling: Gypsum wallboard; Style M, with standard cam lock.
 - d. Fire Rated Openings:
 - 1. General: Style UFR with flush face key operated mortise cylinder lock and interior latch release mechanism; UL rating of 1-1/2 hours; "B" label.
 - 2. Sizes: Custom and as shown.
 - 2. Fasteners: As recommended by manufacturer.
 - 3. Primer: Rust inhibiting as recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Access Panels: Locate access doors as required for access to and operation of mechanical and electrical devices; refer to Division 22 - PLUMBING, Division 23 - HEATING, VENTILATING AND AIR CONDITIONING, and Division 26 - ELECTRICAL.

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SLIDING GLASS DOORS

Section 08 32 00

1. GENERAL:

- A. SUMMARY: Provide Sliding Glass Doors, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): Standards.
 - 2. Aluminum Anodizers Council (AAC): Standards.
 - 3. American Architectural Manufacturers Association (AAMA): AAMA 101 - Aluminum Prime Windows and Sliding Glass Doors.
 - 4. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM E330: Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - c. ASTM E283: Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
 - d. ASTM E2268: Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 5. Glass Association of North America (GANA): Glazing Manual.
 - 6. National Fenestration Rating Association (NFRA): NFRC 100 - Procedure for Determining Fenestration Product Thermal Properties (Currently Limited to U-Value).
 - 7. Window and Door Manufacturers Association (WDMA): WDMA IS-2 - Industry Standard for Wood Windows.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data, and guarantee in required form for a period of FIVE (5) years from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory.
 - b. Environmental Standards: Comply with Green Seal Standard GS-13.
 - 2. Aluminum Sliding Glass Doors:
 - a. General: Terra Slide Series 60E manufactured by Oldcastle Glass Vistawall; sizes as shown.
 - b. Alternate Manufacturers: Comparable products manufactured by Milgard Windows, or accepted equal.
 - c. Extruded Aluminum: ASTM B221, 6063 alloy, T5 temper, hollow tubular sections.
 - d. Pull Handles: Manufacturer's standard; type as selected by the Architect.
 - e. Finishes: Anodized; manufacturer's standard; color as selected by the Architect.
 - 3. Glass and Glazing Materials: Specified in Section 08 81 00 - GLASS GLAZING.
 - 4. Screen:
 - a. Frame: Manufacturer's standard; size of operable glazed unit.
 - b. Mesh: FS RR-W-365, woven aluminum, 14/18 mesh size; black color finish.
 - 5. Hardware:
 - a. Threshold: Manufacturer's standard; thermally broken, sloped to exterior.
 - b. Sliding Panel Bottom Rollers: Manufacturer's standard; adjustable from interior.
 - c. Limit Stops: Resilient rubber.
 - 6. Weatherstripping: Manufacturer's standard.
 - 7. Anchors: Corrosion resistant steel.
 - 8. Bituminous Paint: Fibered asphaltic type.
 - 9. Glass and Glazing: As shown; refer to Section 08 81 00 - GLASS GLAZING.
 - 10. Sealant and Backing Materials: As specified in Section 07 92 10 - JOINT SEALERS.
- B. FABRICATION: Size and fabricate door assembly to allow for tolerances of rough framed openings, clearances, shim spacing and shims around perimeter of assemblies. Ensure joints and connections are flush, hairline, and waterproof. Install glass in fixed and sliding units.

3. EXECUTION:

A. PREPARATION:

- 1. Examination: Examine conditions of work in place before beginning work; report defects.

2. Measurements: Take field measurements; report variance between plan and field dimensions.
 3. Protection: Cover finished surfaces with protective wrapping. Do not use adhesive papers or sprayed coatings which bond to substrate when exposed to sunlight or weather.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Attachment: Anchor frame and shims to perimeter opening to accommodate construction tolerances and other irregularities. Use manufacturer recommended devices to securely fasten sliding door assembly to wall construction without distortion or imposed stresses.
 3. Electrolytic Protection: Coat dissimilar metals with application of bituminous paint.
 4. Sealants: Install perimeter sealant in accordance with Section 07 92 10 - JOINT SEALERS.

* * *

HIGH SPEED ROLLING DOORS

Section 08 36 27

1. GENERAL:

- A. SUMMARY: Provide High Speed Rolling Doors, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. NEMA ICS 2: Standards for Industrial Control Devices, Controllers and Assemblies.
 - c. NEMA MG1: Motors and Generators.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Certificates: UL Certificate of Inspection for fire rated doors exceeding UL listed sizes.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. High Speed Rolling Door:
 - a. General: High Speed Rolling Service Doors manufactured by the RYTEC Corp.; size as shown.
 - b. Alternate Manufacturers: No known equal.
 - c. LEED Certification Requirements: Use materials with recycled metal content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - d. Door Type 1:
 - 1. General: Spiral Standard with manufacturers standard hinged aluminum slat frames with integral rubber weatherseal between slats.
 - 2. Size: As shown.
 - 3. Bottom Bar: Extruded aluminum with electric with reversing edge.
 - e. Door Type 2:
 - 1. General: Spiral FV Full Vision with manufacturers standard hinged aluminum slat frames with clear polycarbonate windows and integral rubber weatherseal between slats.
 - 2. Size: As shown.
 - 3. Bottom Bar: Extruded aluminum with electric with reversing edge.
 - f. Side Frames:
 - 1. General: Manufacturers standard galvanized steel side frames and covers with full-height weatherseal.
 - 2. Door Track: Spiral rollup design.
 - g. Counterbalance: As recommended by the manufacturer.
 - h. Drive system:
 - 1. General: Manufacturers standard 3 HP variable-speed AC Drive motor.
 - 2. Travel Speed: 40 inches per second opening and 30 inches per second closing.
 - i. Door Controls:
 - 1. General: Provide manufacturers standard radio controls, with panel, limit switches, photo eyes and reversing device.
 - 2. Radio Controls:
 - a) General: Multi-frequency type; coordinate with Fire Department for type/frequency of controls.
 - b) Motor Controllers: Manufacturers standard.
 - c) Operator Antennas: Exterior mount; 12 inch to 18 inch size.
 - d) Vehicle Transmitters: Provide forty (40).
 - 3. Exterior: Flush mounted keyed switch; open/close/stop station, momentary contact.
 - 4. Interior: Manufacturer's standard flush mounted three (3) button station.
 - j. Safety Devices:
 - 1. Photo Eyes: Dual thru-beam type mounted at door jamb.
 - 2. Electric Reversing Edge: Full-width at bottom of door.
 - 3. Safety Light System: Pathwatch LED light strip mounted to door jambs at eye level, with amber lights flashing to indicate the door is about to close and red steady to indicate the door is closing.
 - 4. Wireless Bottom Bar: Manufacturers standard.

- k. Manual Operation: Manufacturers standard mechanical release lever for push/pull operation.
2. Fasteners: As recommended by manufacturer; tamper proof type; anchors as shown.
3. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Coordinate installation of bolts or other anchors built into concrete or masonry and identify exact location for installation.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. High Speed Rolling Door:
 - a. General: Set work plumb and true; properly assemble and erect in a rigid manner. Anchor assembly to building framing without distortion or stress; securely brace components suspended from structure. Fit and align assembly including hardware to provide smooth operation.
 - b. Hardware: Install door operators per manufacturer's instructions; locks per Section 08 71 00 - DOOR HARDWARE.
 - c. Tolerances: Maintain dimensional tolerances and alignment with adjacent work; maximum variation from plumb or level of 1/16 inch and maximum longitudinal or diagonal warp of plus or minus 1/8 inch per 10'-0" straight edge.
 - d. Door Controls: Install where shown; coordinate installation of electrical service with Division 26 - ELECTRICAL. Complete wiring from disconnect to unit components and from fire alarm system to door.
3. Sealants: As shown; refer to Section 07 92 10 - JOINT SEALERS.

- #### C. FIELD QUALITY CONTROL
- After installation, demonstrate that each door operates properly and that special features function within requirements.

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FOUR FOLD DOORS

Section 08 35 50

1. GENERAL:

- A. SUMMARY: Provide Four Fold Doors, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Institute of Steel Construction (AISC): AISC Manual of Steel Construction, Allowable Stress Provisions.
 - 2. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 3. American Welding Society (AWS): AWS D1.1 - Structural Welding Code - Steel.
 - 4. National Electrical Manufacturers Association (NEMA):
 - a. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. NEMA ICS 2: Standards for Industrial Control Devices, Controllers and Assemblies.
 - c. NEMA MG1: Motors and Generators.
 - 5. National Fire Protection Association (NFPA): NFPA 70
 - 6. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of five (5) years from date of final acceptance by Owner. Provide quarterly maintenance service and emergency service calls throughout the guarantee period.
- D. QUALITY ASSURANCE:
 - 1. Design Criteria:
 - a. General: Conform to ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - b. Requirements: Design and size units to withstand dead and live loads produced by wind pressure acting normal to plane of wall, calculated per CBC to a design pressure of 24 lbs. per square foot.
 - 2. Qualifications:
 - a. General: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.
 - b. Maintenance Service: Manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Four Fold Doors:
 - a. General: Model 41 Electric Four Fold Doors manufactured by Electric Power Door; size as shown.
 - b. Alternate Manufacturers: Comparable products manufactured by American Metal Door Co. Division of Door Engineering & Manufacturing. Co., Inc., or accepted equal.
 - c. Steel:
 - 1. General: ASTM A36.
 - 2. Tubing:
 - a) Structural Welded: ASTM A500, Grade B.
 - b) Electric Welded: ASTM A513.
 - 3. Face Sheets: ASTM A1011, flat, hot rolled, 14 gauge minimum
 - d. Cast Iron Castings: ASTM A48.
 - e. Glazing: As shown; refer to Section 08 81 00 - GLASS GLAZING.
 - f. Operating Hardware: Manufacturers standard.
 - g. Primer: Refer to Section 09 91 00 - PAINTING.
 - 2. Operators:
 - a. General: Manufacturer's standard .
 - b. Enclosure Type: NEMA 1, UL labled.
 - c. Power:
 - 1. General: Provide manufacturers standard motor controller and overcurrent protection.
 - 2. Motor: Manufacturers standard capable of moving door in either direction at a speed of not less than 2/3, or faster than 1'-0" per second, without exceeding rated capacity.
 - d. Door Controls:
 - 1. General: Provide manufacturers standard radio controls, with panel, limit switches, photo eyes and reversing device.

2. Radio Controls:
 - a) General: Multi-frequency type; coordinate with Fire Department for type/frequency of controls.
 - b) Motor Controllers: Manufacturers standard.
 - c) Operator Antennas: Exterior mount; 12 inch to 18 inch size.
 - d) Vehicle Transmitters: Provide forty (40).
3. Exterior: Flush mounted keyed switch; open/close/stop station, momentary contact.
4. Interior: Manufacturer's standard flush mounted three (3) button station.
5. Audible and Visual Signals: Provide audible alarm and visual indicator lights in compliance with regulatory requirements.
3. Fasteners: As recommended by manufacturer.
4. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects.
2. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Erection: Install door and operating equipment complete with necessary hardware, jamb and head weather strips, anchors, inserts, hangers, and equipment support
3. Operator:
 - a. General: Coordinate installation of electrical service per Division 26 - ELECTRICAL. Complete power and control wiring to unit components.
 - b. Antennas: Install where shown.
4. Sealant: As recommended by manufacturer; refer to Section 07 92 10 - JOINT SEALERS.
5. Finish: Primed and ready for field painting.

C. ADJUSTMENT: Prior to acceptance, adjust moveable parts to assure smooth operation.

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ALUMINUM ENTRANCE AND STOREFRONT Section 08 41 13

1. GENERAL:

- A. SUMMARY: Provide Aluminum Entrance and Storefront, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): The Surface Treatment and Finishing of Aluminum and its Alloys.
 - 2. Aluminum Anodizers Council (AAC): Finishing standards.
 - 3. American Architectural Manufacturers Association (AAMA):
 - a. General: Metal Curtainwall, Window, Store Front and Entrance Guide.
 - b. SFM-1: Aluminum Storefront and Entrance Manual.
 - c. AAMA 501 and 503: Standards for field testing storefront systems.
 - 4. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 5. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 - 6. Door Hardware Institute (DHI): Installation Builder's Hardware.
 - 7. National Fire Protection Association (NFPA):
 - a. NFPA 80: Fire Doors and Windows.
 - b. NFPA 252: Fire Tests for Door Assemblies.
 - 8. Underwriters Laboratories, Inc. (UL): UL 10B - Fire Tests for Door Assemblies.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Certification: Storefront shall bear a permanently installed "AAMA Prime and Replacement Label" bearing the manufacturer's name, product series number, grade and class designations. Do not install label in exposed location.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of three (3) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Design Requirements: Aluminum frame members must span vertically to withstand 25 psf wind load, minimum, per CBC; provide internal reinforcing as required; maximum deflection of L/175 of clear span or maximum of 3/4 inch.
 - 2. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory.
 - b. Environmental Standards: Comply with Green Seal Standard GS-13.
 - c. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - 2. Entrance and Storefront:
 - a. General: Series FG-3000 Window Wall manufactured by Oldcastle Glass Vistawall.
 - b. Alternate Manufacturers: Comparable products manufactured by the Kawneer Co., Inc., or accepted equal.
 - c. Doors:
 - 1. General: Model MS-375 Medium Stile with 10 inch base rail; provide mohair pile weatherstripping where required.
 - 2. Heavy Duty: Rugged Entrance Doors.
 - (3) Hardware: Per Section 08 71 00 - DOOR HARDWARE.
 - d. Operating Windows:
 - 1. General: Zero Sightline 2750; projected and casement type, as shown.
 - 2. Screens: At operable windows; 18/16 mesh fiberglass; in manufacturer's standard aluminum frame.
 - 3. Operating Hardware: Manufacturer's standard; provide poles to operate high windows.
 - e. Finish: Manufacturer's standard anodic; color as selected by Architect.
 - 3. Glass and Glazing: As shown; refer to Section 08 81 00 - GLASS GLAZING.
 - 4. Fasteners: As recommended by manufacturer to meet wind pressures shown.

5. Protective Coatings:
 - a. General: Bituminous, FS TT-C-494, Type II.
 - b. Gasketing: Chromate type.
6. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

A. PREPARATION:

1. Environmental Requirements: Do not install sealants when temperature is less than 40 degrees F.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Measurements: Take field measurements; report variance between plan and field dimensions.
4. Protection: Protect prefinished components with wrapping or strippable coating; adhesive papers and sprayed coatings not acceptable.

B. INSTALLATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
2. Storefront:
 - a. General: Install level, plumb, straight and aligned with adjacent surfaces, with hairline watertight joints; free of dents, buckles, twists, or other imperfections, as shown. Install flashings where shown.
 - b. Anchorage:
 1. General: Anchor to adjacent structure; permit sufficient adjustment to accommodate construction tolerances and other irregularities. Use No. 12 sheet metal screws, or wood screws at 18 inches on center with a minimum of 1 inch penetration into structure.
 2. Tolerances: Maximum variation from plumb of 0.06 inch every 3'-0" non-cumulative or 1/16 inch per 10'-0", whichever is less. Maximum misalignment of two (2) adjoining members abutting in plane of 1/32 inch.
 - c. Operating Windows: Install where shown.
 - d. Thermal Isolation: Provide where components penetrate or disrupt building insulation. Coordinate attachment and seal of perimeter air and vapor barrier materials.
3. Glazing:
 - a. General: As specified under Section 08 81 00 - GLASS GLAZING.
 - b. Glazing Stops: Anchor glass holding assemblies with frame clips and machine screws.
4. Doors:
 - a. General: Hang doors level, plumb, straight in vertical plane, with proper fit and alignment and moving parts operating freely without bind.
 - b. Weatherstripping: Seal doors, meeting stiles of pairs of doors, door tubing, and stops on frames and astragals.
 - c. Thresholds: Set in bed of sealant and secure.
 - d. Hardware: Per Section 08 71 00 - DOOR HARDWARE.
5. Dissimilar Materials: Isolate from other metals, plaster or concrete.
6. Sealant: Install per Section 07 92 10 - JOINT SEALERS.

C. Adjustment: Prior to acceptance, adjust moveable parts to assure smooth operation.

D. Cleaning:

1. Glass: Upon completion, remove labels and thoroughly clean glass surfaces.
2. Aluminum: Remove protective covering per manufacturer's instructions. Clean aluminum surfaces of stains, marks, or other defects, using soap and clean water.

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FIRE RATED ALUMINUM ENTRANCES

Section 08 42 53

1. GENERAL:

- A. SUMMARY: Provide Fire Rated Aluminum Entrances, as shown and specified per Contract Documents.
- B. REFERENCES:
1. Aluminum Association (AA): The Surface Treatment and Finishing of Aluminum and its Alloys.
 2. Aluminum Anodizers Council (AAC): Finishing standards.
 3. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM E119: Methods for Fire Tests of Building Construction and Materials.
 - c. ASTM E152: Methods of Fire Tests of Door Assemblies.
 - d. ASTM E2110: Standard Test for Positive Pressure of Fire Tests of Window Assemblies.
 4. American National Standards Institute (ANSI): ANSI Z97.1 Standard for Safety Glazing Materials Used In Buildings.
 5. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 6. Door Hardware Institute (DHI): Installation Builder's Hardware.
 7. Glass Association of North America (GANA):
 - a. General: GANA Glazing Manual.
 - b. Glazing Sealants: GANA Sealant Manual.
 8. National Fire Protection Association (NFPA):
 - a. NFPA 80: Fire Doors and Windows.
 - b. NFPA 251: Fire Tests of Building Construction and Materials.
 - c. NFPA 252: Fire Tests of Door Assemblies.
 - d. NFPA 257: Fire Tests of Window Assemblies.
 9. Underwriters Laboratories, Inc. (UL):
 - a. UL 9: Standard for Safety of Fire Tests of Window Assemblies.
 - b. UL 10B: Standard for Safety of Fire Tests of Door Assemblies.
 - c. UL 10C: Standard for Safety of Positive Pressure Fire Tests of Door Assemblies.
 - d. UL 263: Fire Tests of Building Construction and Materials.
 10. U.S. Consumer Product Safety Commission (CPSC): 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
- C. SUBMITTALS:
1. General: Submit product data and shop drawings.
 2. Closeout: Submit maintenance data, and guarantee in required form for a period of five (5) years from date of final acceptance by Owner.
- D. QUALITY ASSURANCE:
1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
1. LEED Certification Requirements:
 - a. VOC Materials Compliance:
 1. General: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 2. Windows, Glass Doors and Skylights: Green Seal Standard GS-13.
 3. Commercial Adhesives: Seal Standard GS-36.
 - b. Recycled Metal Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 2. Fire Rated Aluminum Entrances:
 - a. General: GPX Architectural Series 300 Series manufactured by SAFTIFIRST.
 - b. Alternate Manufacturers: Comparable products manufactured by Technical Glass Products, or accepted equal.
 - c. Doors:
 1. Single: Model No. GPX-DS-20P-SLI.
 2. Hardware: Specified under Section 08 71 00 - DOOR HARDWARE.
 - d. Wall/Window: Manufacturers standard GPX Series.

- e. Glass:
 - 1. General: SuperSecure II-XLS 45-120 for 45 minute rating.
 - 2. Glazing Accessories: Manufacturers standard for 45 minute rating.
- f. Finish: Manufacturers standard; color anodic per AAMA 606.1, color as selected by the Architect.
- 3. Protective Coatings:
 - a. General: Bituminous, FS TT-C-494, Type II.
 - b. Gasketing: Chromate type.
- 4. Fasteners and Anchors: As recommended by manufacturer.
- 5. Sealant: As recommended by manufacturer.
- B. FABRICATION:
 - 1. General: Fabricate as shown. Provide knocked down for field assembly for field glazing.
 - 2. Hardware: Factory prepare for field mounting of hardware; refer to Section 08 71 00 - DOOR HARDWARE.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Protection: Protect prefinished components with wrapping or strippable coating; adhesive papers and sprayed coatings not acceptable.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Wall/Window:
 - a. General: Install level, plumb, straight and aligned with adjacent surfaces, with hairline joints; free of dents, buckles, twists, or other imperfections.
 - b. Anchorage:
 - 1. General: Anchor to adjacent structure; permit sufficient adjustment to accommodate construction tolerances and other irregularities.
 - 2. Tolerances: Maximum variation from plumb of 0.06 inch every 3'-0" non-cumulative or 1/16 inch per 10'-0", whichever is less. Maximum misalignment of two (2) adjoining members abutting in plane of 1/32 inch.
 - 3. Doors:
 - a. General: Hang doors level, plumb, straight in vertical plane, with proper fit and alignment and moving parts operating freely without bind.
 - b. Hardware: Refer to Section 08 71 00 - DOOR HARDWARE.
 - 4. Glass: Install as shown, per manufacturers instructions.
 - 5. Dissimilar Materials: Isolate from other metals, plaster or concrete.
 - 6. Sealant: Install per Section 07 92 10 - JOINT SEALERS.
 - 7. Adjustment: Prior to acceptance, adjust moveable parts to assure smooth operation.
 - 8. Cleaning:
 - a. Glass: Upon completion, remove labels and thoroughly clean glass surfaces.
 - b. Aluminum: Remove protective covering per manufacturer's instructions. Clean aluminum surfaces of stains, marks, or other defects, using soap and clean water.

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GLAZED ALUMINUM CURTAIN WALL

Section 08 44 13

1. GENERAL:

A. SUMMARY: Provide Glazed Aluminum Curtain Wall, as shown and specified per Contract Documents.

B. REFERENCES:

1. Aluminum Association (AA): The Surface Treatment and Finishing of Aluminum and its Alloys.
2. Aluminum Anodizers Council (AAC): Finishing standards.
3. American Architectural Manufacturers Association (AAMA):
 - a. General: AAMA Aluminum Curtain Wall Design Guide Manual.
 - b. AAMA Curtain Wall Manual #10: Care and Handling of Architectural Aluminum From Shop to Site.
 - c. AAMA Series No. 11: Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing.
 - d. AAMA 501: Methods of Test for Metal Curtain Walls.
 - e. AAMA 607.1: Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
 - f. AAMA T1R - A1: Sound Control for Aluminum Curtain Walls and Windows.
 - g. AAMA FC-1: Field Check of Metal Curtain Walls for Water Leakage.
4. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM A36: Structural Steel.
 - c. ASTM A123: Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron or Steel Products.
 - d. ASTM A489: Standard Test Method for Tensile Strength Properties of Metal Connector Plates.
 - e. ASTM B209: Aluminum and Aluminum-Alloy Sheet and Plate.
 - f. ASTM B221: Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
 - g. ASTM E283: Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
 - h. ASTM E330: Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - i. ASTM E331: Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - j. ASTM E413: Classification for Determination of Sound Transmission Class.
5. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
6. Steel Structures Painting Council (SSPC): SSPC 15 - Steel Joist Shop Primer/Metal Building Primer.

C. SUBMITTALS:

1. General: Submit product data, shop drawings and samples.
2. Shop Drawings:
 - a. Design Criteria:
 1. General: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of wall per CBC requirements and as measured in accordance with ASTM E330. System to accommodate, without damage to system, components or deterioration of seals; movement within system; movement between system and perimeter framing components; dynamic loading and release of loads.
 2. Mullion Deflection: Limit to L/175 but not to exceed flexure of glass; with full recovery of glazing materials.
 3. Thermal Resistance of Wall System: Condensation Resistance (7-1/4 inch unit) shall be rated CRF 67 measured at frame only or CRF 55 measured with 1 inch insulated clear glass per AAMA 1504.88. Thermal transmittance shall be rated .72 BTU.
 4. Air Infiltration: Limit through assembly to 0.01 cfm per minute per square foot of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E283.
 5. Water Leakage: None, when measured at test pressure of 15 PSF in accordance with ASTM E331.
 6. Expansion and Contraction: Within system components caused by a cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components.
 7. Water Drainage: Drain water entering joints, condensation occurring in glazing channels,

- or migrating moisture occurring within system, to the exterior by a weep drainage network.
8. Air and Vapor Barrier: Maintain continuous throughout assembly, primarily in line with pane of glass and heel bead of glazing compound.[Position thermal insulation on exterior surface of air and vapor barrier.]
 9. Conditions Not Permitted: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
- b. Design and Construction Documents:
1. General: Submit construction documents based on the schematic plans shown on the Drawings, as required to obtain Building Permits. Arrangement of systems shown are diagrammatic and indicate minimum requirements.
 2. Drawings: Provide 24 inch x 36 inch drawings.
 3. Specifications: Incorporate data and information required to adequately describe installation. Use CSI three-part Section format.
 4. Calculations: As required by the applicable codes, local ordinances and in compliance with the stated design requirements.
- c. Submittal:
1. General: Submit six (6) copies of approved shop drawings to the Architect for review.
 2. Permits: Upon completion of review by Architect submit drawings, specifications and calculations to the permitting authority for approval and obtain required permits prior to commencement of installation work.
3. Test Reports: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES. Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data.
4. Closeout: Submit maintenance data and guarantee in required form for a period of five (5) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
1. General: Company specializing in manufacturing aluminum curtain wall systems with minimum 10 years documented experience.
 2. Installer: Specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.
 3. Design-Build Documents: Prepared by a structural engineer registered to practice in the State of California.

2. PRODUCTS:

A. MATERIALS:

1. Glazed Aluminum Curtain Wall:
 - a. General: Model No. T500-OPG1500 (Thermal) manufactured by Arcadia, Inc.; for 1 inch glazing set in 2-1/4 inch X 5-1/2 inch) mullion profiles; pressure glazed, front set, exterior glazed.
 - b. Alternate Manufacturers: No equals will be accepted.
 - c. Door:
 1. General: MS362 Series Medium Stile - Offset Hung, with 10 inch base rail; provide mohair pile weatherstripping where required.
 2. Hardware: Per Section 08 71 00 - DOOR HARDWARE.
 - d. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - e. Materials:
 1. Extruded Aluminum: ASTM B221, T6 temper.
 2. Sheet Aluminum: ASTM B209.
 3. Sheet Steel: ASTM A489; galvanized per ASTM A 386 to 2.0 ounces per square foot.
 4. Steel Sections: ASTM A36; shaped to suit mullion sections.
 5. Fasteners: Manufacturer's standard stainless steel.
 6. Primer for Steel Components: SSPC 15, Type 1, red oxide.
 - f. Finish: Manufacturer's standard anodic; color as selected by Architect.
2. Glazing:
 - a. General: Refer to Section 08 81 00 - GLASS GLAZING..
 - b. Exterior Gaskets: Manufacturer's standard E.P.D.M.
 - c. Interior Seal: Manufacturer's standard closed cell P.V.C. foam.
 - d. Thermal Isolation: Manufacturer's standard rigid vinyl separator.
3. Doors:
 - a. General: Hang doors level, plumb, straight in vertical plane, with proper fit and alignment and moving parts operating freely without bind.

- frames and astragals.
- c. Thresholds: Set in bed of sealant and secure.
- d. Hardware: Per Section 08 71 00 - DOOR HARDWARE.
- 4. Fasteners: As recommended by manufacturer to meet wind pressures shown.
- 5. Protective Coatings:
 - a. General: Bituminous, FS TT-C-494, Type II.
 - b. Gasketing: Chromate type.
- 6. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.
- B. FABRICATION:
 - 1. General: Fabricate curtain wall components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof. Prepare components to receive anchor devices and fabricate anchors. Arrange fasteners and attachments to ensure concealment from view.
 - 2. Steel Reinforcement: Provide within constraints shown.
 - 3. Finishes:
 - a. General: Caustic etch exposed surfaces and apply selected finish.
 - b. Concealed Steel Items: Primed with iron oxide paint.
 - c. Protective Coating: Apply one (1) coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Coordinate with installation of firestopping or air and vapor barrier materials. Verify continuity of thermal barrier is maintained.
 - 2. Environmental Requirements: Do not install sealants when temperature is less than 40 degrees F.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.
 - 4. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 5. Delivery: Handle work of this Section in accordance with AAMA - Curtain Wall Manual #10.
 - 6. Protection: Protect prefinished components with wrapping or strippable coating; adhesive papers and sprayed coatings not acceptable.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Glazed Aluminum Curtain Wall:
 - a. General: Install plumb and level, free of warp and twist, and aligned with adjacent surfaces, with hairline watertight joints; free of dents, buckles, twists, or other imperfections, as shown. Install flashings where shown.
 - b. Anchorage: Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities. Provide alignment attachments and shims to permanently fasten system to building structure.
 - c. Tolerances:
 - 1. Maximum Variation from Plumb: 0.06 inches every 3'-0" non-cumulative or 0.5 inches per 100'-0", whichever is less.
 - 2. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
 - d. Thermal Isolation: Provide where components penetrate or disrupt building insulation. Coordinate attachment and seal of perimeter air and vapor barrier materials.
 - 3. Glazing:
 - a. General: As specified under Section 08 81 00 - GLASS GLAZING.
 - b. Glazing Stops: Anchor glass holding assemblies with frame clips and machine screws.
 - 4. Dissimilar Materials: Isolate from other metals, plaster or concrete.
 - 5. Sealant: Install per Section 07 92 10 - JOINT SEALERS.
- C. CLEANING:
 - 1. General: Touch up minor scratches and abrasions on finished surfaces to match original finish.
 - 2. Glass: Upon completion, remove labels and thoroughly clean glass surfaces.
 - 3. Aluminum: Remove protective covering per manufacturer's instructions. Clean aluminum surfaces of stains, marks, or other defects, using soap and clean water.

* * *

TRANSLUCENT PANEL SKYLIGHT SYSTEM Section 08 45 34

1. GENERAL:

- A. SUMMARY: Provide Translucent Panel Skylight System, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): Specifications for Aluminum Structures.
 - 2. American Architectural Manufacturers Association (AAMA):
 - a. AAMA 501: Methods for Test for Metal Curtain Walls.
 - b. AAMA 603: Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - c. AAMA 2604: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - d. AAMA 611: Specification for Anodized Architectural Aluminum.
 - 3. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout:
 - a. General: Submit maintenance data and test reports.
 - b. Guarantee:
 - 1. General: Submit in required form for the following periods from the date of final acceptance by City.
 - 2. System: Five (5) years.
 - 3. Translucent Glazing Material: Ten (10) years.
- D. QUALITY ASSURANCE:
 - 1. Performance Requirements:
 - a. General: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting on plane of panel as calculated in accordance with CBC and as measured in accordance with ANSI/ASTM E330.
 - b. Deflection: Limit mullion deflection to 1/4 inch, with full recovery of glazing materials.
 - c. Expansion, Contraction and Movement: System to accommodate, without damage to system, components or deterioration of seals: movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; deflection of structural support framing and a mid-span slab edge of deflection of 1/4 inch. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components.
 - d. Light Transmission: 14 percent.
 - e. Thermal Resistance of Panel System: R value of 4.
 - 2. Qualifications:
 - a. Manufacturer and Installer: Specialized in the manufacture and installation of translucent panel systems with minimum five (5) years documented experience.
 - b. Engineering: Design structural support framing components under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of California.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Translucent Panel Skylight System:
 - a. General: Kalwall 100 Translucent Fiberglass Sandwich Panel System manufactured by KalWall Corporation.
 - b. Alternate Manufacturers: Comparable products manufactured by Major Industries, Inc., or accepted equal.
 - c. Panels:
 - 1. General: Manufacturer's standard sandwich panel.
 - 2. Size: Thickness as shown.
 - 3. Grid:
 - a) General: Mechanically interlocked aluminum.
 - b) Size: As shown.
 - c) Pattern: Shoji.

4. Exterior Sheet:
 - a) General: Manufacturer's standard fiberglass; exposed surface permanently chemically treated to protect against surface erosion and weather.
 - b) Color: As selected by the Architect.
5. Interior Sheet:
 - a) General: Manufacturer's standard fiberglass; flame spread rating no greater than 50 and smoke developed no greater than 250.
 - b) Color: As selected by the Architect.
- d. Framing System:
 1. General: Manufacturer's standard aluminum.
 2. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 3. Battens and Perimeter Closure Systems: Manufacturer's standard with factory prefabricated "Superbreak", as shown.
 4. Finish: Manufacturer's standard anodized; color selected by the Architect.
 5. Weather Seals: Manufacturer's standard to suit application; non-bleeding; non-staining.
2. Fasteners: As recommended by manufacturer; concealed.
3. Protective Coating: Bituminous, FS TT-C-494, Type II.
4. Sealant: Refer to Section 07 92 10 - JOINT SEALERS; as recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 1. Environmental Requirements: Do not install sealants when ambient temperature is less than 40 degrees F. Maintain minimum temperature during and after installation.
 2. Examination: Examine conditions of work in place before beginning work; report defects.
 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 4. Protection: Protect prefinished surfaces with wrapping or strippable coating; do not use adhesive papers or sprayed coatings.
- B. INSTALLATION:
 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Translucent Panel System:
 - a. General: Install as shown, including fastening and sealing; provide weep holes as required.
 - b. Attachment and Adjustment: Attach to structure to permit sufficient adjustment to accommodate construction tolerances, thermal and mechanical movement. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work as required.
 - c. Thermal Isolation: Provide where components penetrate or disrupt building insulation.
 3. Sealant: As shown.
 4. Dissimilar Materials: Isolate from other metals, plaster or concrete.
- C. FIELD QUALITY CONTROL:
 1. General: Install panel system under direct supervision of manufacturer's representative.
 2. Water Penetration Test:
 - a. General: Perform NAAMM Standard FC-1, Water Penetration Test after erection; submit report.
 - b. Retesting: Make necessary corrections to non-conforming work; retest at Contractor's expense.

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TUBULAR SKYLIGHTS

Section 08 62 23

1. GENERAL:

- A. SUMMARY: Provide Tubular Skylights, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Architectural Manufacturers Association (AAMA):
 - a. AAMA 605.2: Application Process for Thermosetting Acrylic Finish.
 - b. AAMA 606.1: Application of Color Anodic Finishes.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications:
 - a. General: Skylight unit California State Fire Marshal listed.
 - b. Installer: Specialized in performing the work of this Section with minimum three (3) years experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Tubular Skylights:
 - a. General: Manufactured by Solatube International, Inc., length and ceiling mount as shown.
 - b. Alternate Manufacturers: Comparable products manufactured by Daylighting Technologies, Inc., or accepted equal.
 - c. Type: SolaMasters Series, 330 DS.
 - d. Diffuser: OptiView, with Warm Effect Lens.
 - e. Flashing: Curb Mounted as shown.
 - 2. Fasteners: As shown.
 - 3. Protective Coating: FS TT-C-494, Type II.
 - 4. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Skylights: Install to established lines and levels; shim curb as required, anchor to structure and make watertight. Provide continuous bead of sealant between frame and curb.
 - 3. Dissimilar Materials: Separate aluminum and other metals with specified protective coating.
- C. FIELD QUALITY CONTROL:
 - 1. General: Perform NAAMM Standard FC-1, Water Penetration Test after erection.
 - 2. Retesting: Make necessary corrections to non-conforming work; retest at Contractor's expense.

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METAL FRAMED SKYLIGHT

Section 08 63 00

1. GENERAL:

- A. SUMMARY: Provide Metal Framed Skylight, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): DAF-45; Designation System For Aluminum Finishes.
 - 2. Aluminum Anodizers Council (AAC): Standards.
 - 3. American Architectural Manufacturers Association (AAMA):
 - a. General: Metal Curtainwall, Window, Store Front and Entrance Guide.
 - b. SFM-1: Aluminum Storefront and Entrance Manual.
 - c. AAMA 501.2: Field Check of Metal Curtain Walls for Water Leakage.
 - d. AAMA 501.3: Field Check of Water Penetration Through Installed Exterior Windows, Curtain Walls and Doors by Uniform Pressure Difference.
 - e. AAMA 603.8: Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
 - f. AAMA 605.2: Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - g. AAMA 606.1: Voluntary Guide Specification and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
 - h. AAMA 607.1: Voluntary Guide Specification and Inspection Methods Clear Anodic Finishes for Architectural Aluminum.
 - 4. American National Standards Institute (ANSI): Z97.1 Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
 - 5. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 6. U.S. Consumer Products Safety Commission (CPSC): 16CFR 1202 - Architectural Glazing Standards and Related Materials.
 - 7. Glass Association of North America (GANA): "Engineering Standards Manual" and "Glazing Manual".
 - 8. Insulating Glass Certification Council (IGCC): Classification of Glass Units.
 - 9. Underwriters' Laboratories, Inc. (UL): UL 10B, Fire Tests for Door Assemblies.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Samples:
 - a. General: If specifically requested.
 - b. Colors: Submit manufacturer's standard colors.
 - 3. Calculations: Submit calculations prepared under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of California.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Design Criteria:
 - a. General: Per CBC requirements. Aluminum frame members must withstand 25 psf wind load, minimum. Provide internal reinforcing as required; maximum deflection of L/175 of clear span or maximum of 3/4 inch.
 - b. Water Penetration: Per ASTM E331 - no water penetration under differential static pressure of 20% of the inward design wind load, but not less than 6.24.
 - c. Thermal Movement: Provide for expansion and contraction under a surface temperature range of +/-50 degrees F, without reduction of performance or failure of components.
 - 2. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Metal Framed Skylight:
 - a. General: Custom Metal Framed Skylight manufactured by Acralight International Skylights.
 - b. Alternate Manufacturers: Comparable products manufactured by Oldcastle Glass Naturalite, or accepted equal.
 - c. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.

- d. Materials:
 - 1. Aluminum:
 - a) General: 6063-T5, 6063-T6 or 6061-T6 per ASTM B221; sizes, shapes and profiles as required.
 - b) Flashing: 5005 H34; 20 gage minimum thickness.
 - c) Fasteners: Manufacturer's standard.
 - d) Finish: Manufacturer's standard color anodic; color selected by the Architect.
 - 2. Glazing:
 - a) General: Refer to Section 08 81 00 - GLASS GLAZING.
 - b) Glass:
 - 1) General: As required for the application shown; probability of breaking 8/1000 at vertical application and 1/1000 at sloped application.
 - 2) Laminated: Per ANSI and CSPC requirements. PVB layer 0.030 inch thick for annealed glass; 0.060 inch for heat strengthened glass.
 - 3) Insulating: Per PBA and IGCC requirements, with dual edge seals with silicone secondary seal. Provide exterior lite of tempered glass and interior lite of laminated glass.
 - c) Glazing:
 - 1) General: Manufacturer's standard.
 - 2) Glazing Strips: Extruded EDPM rubber per ASTM D2240 and ASTM D412; elongation 500% minimum; black color.
 - 3) Setting Blocks: Extruded Type II silicone rubber per ASTM D2240.
 - 4) Fasteners: Manufacturer's standard.
 - 3. Sealants: Refer to Section 07 92 10 - JOINT SEALERS.
 - 4. Anchors: As recommended by manufacturer.
 - 5. Protective Coating:
 - a) General: Bituminous; conforming to FS TT-C-494.
 - b) Gasketing: Chromate type.
- 2. Fasteners: As recommended by manufacturer and as shown.
- B. FABRICATION: Fabricate units as shown and assemble unit in shop; disassemble as required for shipment and convenience of site installation.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements: Do not install sealants when temperature falls below 40 degrees F.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 4. Protection: Protect pre-finished surfaces with wrapping or stripable coating; do not use adhesive papers or sprayed coatings. Maintain labels and protect glass until final acceptance.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Attachment:
 - a. General: Align plumb and level in proper alignment with established lines and elevations; anchor to structure; and maintain dimensional tolerances.
 - b. Tolerances:
 - 1. Maximum Variation from Plane or Location: 1/8 inch per 12'-0" in length, or 1/2 inch in total length.
 - 2. Maximum Offset to True Alignment: 3/32 inch between members abutting end to end or edge to edge in line, or separated by less than 3 inches.
 - 3. Glass: Install glass in accordance with Section 08 81 00 - GLASS GLAZING.
 - 4. Sealant: Install per Section 07 92 10 - JOINT SEALERS; apply as shown, make installation fully watertight.
 - 5. Dissimilar Materials: Separate concealed aluminum surfaces in contact with ferrous metals, concrete, masonry or plaster with bituminous coating compound.

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DOOR HARDWARE

Section 08 71 00

1. GENERAL:

- A. SUMMARY: Provide Door Hardware, as shown and specified per Contract Documents.
- B. REFERENCES:
1. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 2. American National Standards Institute (ANSI): ANSI A117.1 and the California Code of Regulations, Title 24.
 3. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers standard specifications.
 4. Architectural Woodwork Institute (AWI): Quality standards.
 5. Builders Hardware Manufacturers Association (BHMA): Hardware standards.
 6. California Building Code (CBC): Hardware standards.
 7. Door and Hardware Institute (DHI): Hardware standards.
 8. National Fire Protection Association (NFPA): NFPA 252, 80, 101, and 105.
 9. Underwriters Laboratories, Inc. (UL):
 - a. UL 10B: Fire Test for Door Assemblies.
 - b. UL 305: Panic Hardware.
 10. Woodwork Institute (WI): Manual of Millwork.
- C. SUBMITTALS:
1. General:
 - a. General: Submit product data, test reports, certificates and as follows:
 - b. Shop Drawings:
 1. General: Submit detailed finish hardware schedule in vertical format as follows:
 2. List groups and suffixes in proper sequence.
 3. Completely describe door and list architectural door number.
 4. Provide name of manufacturer, product name, catalog number, function, type, style, size and finish of each item.
 5. Show mounting locations.
 6. Explain abbreviations and symbols used in schedule.
 7. Provide detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment, and access control equipment, and door and frame rough-ins required for specific opening.
 - c. Samples:
 1. General: If specifically requested for specified products; required for alternate products.
 2. Substitutions Requests: Refer to Section 01 25 00 - SUBSTITUTION PROCEDURES. Submit schedule and sample of each item proposed for substitution. Clearly mark each sample indicating type of item, manufacturer's name, catalog number and item for which it is proposed to be substituted.
 3. Disposition: Accepted samples may be used in work; rejected samples will be returned.
 2. Closeout:
 - a. Maintenance Data: Provide manufacturer's instructions and special maintenance tools and accessories as required. Provide three copies of the lock service manual.
 - b. Guarantee:
 1. General: Provide in required form for a period of one (1) year from date of final acceptance by City and as follows:
 2. Manufacturer's Warranty:
 - a) Door Closers: Ten (10) years.
 - b) Exit Devices: Five (5) years.
 - c) All Other Hardware: Two (2) years.

D. QUALITY ASSURANCE:

1. Manufacturers: Specializing in production of institutional and commercial door hardware for a minimum of five (5) years.
2. Supplier:
 - a. General: A firm specializing in the supply and servicing of institutional and commercial door hardware for at least five (5) years.
 - b. Personnel: Employ an Architectural Hardware Consultant (AHC or DAHC), accredited by the Door and Hardware Institute (DHI), to supervise detailing and supply of material for the Project. If requested, inspect final installation and report problems and suggested corrective measures to the Architect.

3. Coordination:
 - a. General: Apply hardware to aluminum or metal doors and frames, and factory prepared wood doors and frames, to template; provide two (2) copies of accepted Finish Hardware Schedule for use by door and frame suppliers.
 - b. Distribution: Furnish two (2) copies of each template to manufacturers who are not listed as current template book holders; furnish two (2) copies of each template for items whose manufacturers do not provide registered template book..

2. PRODUCTS:

A. MANUFACTURERS:

ITEM	MANUFACTURER	ACCEPTABLE SUBSTITUTES
Hinges/Cont. Hinges	Ives	Stanley, McKinney, Hager
Locks and Latches	Schlage	Best
IC Cylinders	Best	Project standard, no substitute
Exit Devices	Von Duprin	Precision
Closers	LCN	Stanley, Norton
Push, Pulls & Protection Plates	Ives	Trimco, Quality
Stops, Silencers	Ives	Trimco, Quality
Hold Opens	Glynn Johnson	Rixon
Thresholds	National Guard	Pemko, Zero
Seals & Bottoms	National Guard	Pemko, Zero

B. MATERIALS:

1. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins. 3 knuckle hinges speced.
 - a. Hinges shall be sized in accordance with the following:
 1. Height:
 - a) Doors up to 41" wide: 4-1/2" inches.
 - b) Doors 42" to 48" wide: 5 inches.
 2. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 3. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
 - b. Furnish non-removable pins (NRP) at all exterior outswing doors and interior key lock doors with reverse bevels. Continuous hinges on heavy traffic doors.
2. Heavy Duty Cylindrical Locks and Latches: Best cylinders as specified, fastened with through-bolts and threaded chassis hubs.
 Chassis: Cylindrical design, corrosion-resistant plated cold-rolled steel.
 Locking spindle: Stainless steel, one piece interlocking design.
 - a. Latch Retractors: Forged steel. Balance of inner parts: Corrosion-resistant plated steel, or stainless steel.
 - b. Lever Trim: Accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
 - c. Locks shall be of such construction that when locked, the door may be opened from within by using lever and without the use of a key or special knowledge.
 - d. Rosettes: Minimum 3-7/16" diameter for coverage of ANSI/DHI A115.18, 1994 door preparation, through-bolt lugs on both spring cages to fully engage this pattern.
 - e. Springs: Full compression type.
 - f. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 - g. Removable core cylinders on all locks and panics.
3. Exit devices: Von Duprin 99 series (5 year warranty) with push-through pad design, no exposed touch bar fasteners, no exposed cavities when operated.
 - a. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 1994 standards.
 - b. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
 - c. Mechanism case shall have an average thickness of .140".
 - d. Compression spring engineering.
 - e. Non-handed basic device design with center case interchangeable with all functions. All devices shall have quiet return fluid dampeners.
 - f. All latchbolts shall be deadlocking with 3/4" throw and have a self-lubricating coating to reduce friction and wear.
 - g. Device push bar must release when a force of 32 pounds, or less, of pressure is applied when a force of 250 pounds is applied to the door.
 - h. Device shall bear UL label for fire and or panic as may be required.
 All surface strikes shall be roller type and utilize a plate underneath to prevent movement.

.130" thickness, match lockset lever design.

Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.

Furnish glass bead kits for vision lites where required.

All Exit Devices to be sex-bolted to the doors.

Panic Hardware shall comply with UBC Standard 10-4 and shall be mounted between 30" and 44" above the finished floor surface. The unlatching force shall not exceed 15 lbs. applied in the direction of travel. Panic hardware shall comply with CBC Section 1008.1.9.

4. Closers: LCN 4041 series as scheduled. Place closers inside building.
 - a. Door closer cylinders shall be of high strength cast iron construction with double heat-treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.
 - b. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 1 1/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.
 - c. All parallel arm closers shall incorporate one-piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
 - d. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
 - e. Closers shall be installed to permit doors to swing 180 degrees.
 - f. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
 - g. Drop brackets are required at narrow head rails. Maximum effort to operate doors shall not exceed 5 lbs. for exterior doors and 5 lbs. for interior doors, such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the door may be increased not to exceed 15 lbs. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. Reference CBC Sections 11B-309.4, 11B-404.2.8, & 11B-404.2.9.
 - h. Provide sex-bolted or bolt mounting for all door closers.
5. Door Stops:
 - a. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Wall type is acceptable.
 - b. Do not install floor stops more than four (4) inches from the face of the wall or partition (Title 24, 11B-307).
6. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
7. Thresholds: As Scheduled and per details. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Use 1/4" fasteners, red-head flat-head sleeve anchors (SS/FHSL). Thresholds shall comply with CBC Section 11B-404.2.5.
8. Seals: Sponge silicone gasketing to meet ASTM E 283-1984 test standards. Provide silicone gasket at all rated and exterior doors.
9. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

C. KEYING

1. Furnish a Grand Master, Master, keyed alike or keyed different system as directed by the City or Architect. All locks to be supplied "0" bitted.
2. Key Blanks: Per City Standards
3. Supply keys and blanks as follows:
 - a. Supply 2 cut change keys for each different change key code.
 - b. Supply 1 uncut key blank for each change key code.
 - c. Supply 6 cut master keys for each different master key set.
 - d. Supply 3 uncut key blanks for each master key set.

D. FINISHES

1. Generally to be satin chromium US26D (626) unless otherwise noted.

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Attachment E - Technicals

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2. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.
3. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
4. Aluminum items to be finished anodized aluminum 313, except thresholds which can be furnished as standard mill finish.

E. FASTENERS

1. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
4. Provide expansion anchors for attaching hardware items to concrete or masonry.
5. All exposed fasteners shall have a phillips head.
6. Finish of exposed screws to match surface finish of hardware or other adjacent work.
7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or hex bolts at all exterior openings.

3. EXECUTION:

A. PREPARATION:

1. Examination: Examine conditions of work in place before beginning work; report defects.
2. Measurements: Take field measurements; report variance between plan and field dimensions.
3. Delivery:
 - a. Packaging: Identify door number, hardware type, location and hand of door on each package.
 - b. Keys: Label and deliver keys by registered mail or personal messenger directly to Architect.

B. APPLICATION:

1. General: Install in strict conformance with referenced standards, the manufacturer's written directions, as shown, and as herein specified.
2. Hardware Placement:
 - a. General: Except for hinges, do not install hardware until completion of painting and finishing work. Unless otherwise shown, place hardware at following height above finish floor:
 - b. Strike (Centerline) for Locks and Latches: Between 40 inches and 42 inches.
 - c. Hinges: Manufacturer's standard.
 - d. Door Pull (Centerline): 42 inches.
 - e. Push Plate (Centerline): 44 inches.
 - f. Deadlocks (Centerline of Cylinder): 44 inches.
3. Floor Clearances:
 - a. Labeled Doors: 3/8 inch maximum over floor or threshold.
 - b. No Threshold: 3/4 inch maximum for metal doors; 5/8 inch maximum for wood doors.
 - c. Threshold: 1/8 inch typical.
 - d. Carpet: 1/8 inch over top of nap, unless otherwise shown.
4. Installation:
 - a. General: Install hardware in precise manner; door clearance and hardware placement as specified. Predrill pilot holes in wood for screws. Drill and tap for surface mounted hardware on metal.
 - b. Hinges: Set hinge leaves snug and flat in mortises; turn screws to flat seat (do not drive). Drive hinge pins down and tighten set screws.
 - c. Closers: Mount door closers for maximum swing of door before setting stops.
 - d. Silencers: Set in place before adjusting strikes.
 - e. Locksets: Install locks with keyways in proper position; levers, roses and escutcheons firmly attached.
 - f. Thresholds: Set in waterproof sealant; secure with lead shields and countersunk screws of same finish as threshold.

C. ADJUSTMENT AND MAINTENANCE:

1. General: Prior to acceptance, adjust moveable parts to assure smooth operation.
2. Door Closers: Adjust for closing speed, latching speed, back checking, and hold-open devices for full control of door. Adjust operation of doors to require a maximum of 5.0 lbs. for exterior doors; 5.0 lbs. for interior doors; and 15 lbs. for fire doors.

D. HARDWARE SCHEDULE:

Hardware Group No. 01

For use on door(s): 106B

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 5 X 4.5	630	IVE
1 EA	EXIT HARDWARE	2114 X 4914A	630	PRE
1 EA	SURFACE CLOSER	4041 RW/PA	689	LCN
2 EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
1 EA	DOME STOP	FS436	652	IVE
1 EA	SMOKE SEAL	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 01A

For use on door(s): 325C

Provide each PR door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
6 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	FIRE EXIT HARDWARE	FL2201-LBR	630	PRE
1 EA	FIRE EXIT HARDWARE	FL2214-LBR X4914A	630	PRE
2 EA	SURFACE CLOSER	4041	689	LCN
2 EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2 EA	MAGNETIC HOLD OPEN	SEM 7830 (OR 7840/7850)	ALU	LCN
1 SET	MEETING STILE	130NA 2/84"	AL	NGP
2 EA	DOME STOP	FS436	652	IVE
6 SET	SMOKE SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 02

For use on door(s): 001A, 110B

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	FIRE EXIT HARDWARE	FL2101	630	PRE
1 EA	ELECTRONIC LOCK	AD-200-993R-PRK	626	SCH
1 EA	SURFACE CLOSER	4041 EDA (PUSH)	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
1 SET	SMOKE SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 02A

For use on door(s): 102A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	633	IVE
1 EA	PANIC HARDWARE	2101	630	PRE
1 EA	ELECTRONIC LOCK	AD-200-993R-PRK	626	SCH
1 EA	ELECTRIC STRIKE	6211 FSE 24VDC	633	VON
1 EA	POWER SUPPLY	PS902	GRY	VON
1 EA	SURFACE CLOSER	4041 EDA	696	LCN
1 EA	DOME STOP	FS438	606	IVE
1 SET	SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	DKB	NGP

THIS DOOR HAS A REMOTE ELECTRONIC RELEASE, SEE ELECTRICAL DRAWINGS.

Hardware Group No. 02B

For use on door(s): 106A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PANIC HARDWARE	2101	630	PRE
1 EA	ELECTRONIC LOCK	AD-200-993R-PRK	626	SCH
1 EA	SURFACE CLOSER	4041 EDA (PUSH)	689	LCN
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 02C

For use on door(s): 110A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PANIC HARDWARE	2101	630	PRE
1 EA	ELECTRONIC LOCK	AD-200-993R-PRK	626	SCH
1 EA	SURFACE CLOSER	4041 EDA (PUSH)	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	606	IVE
3 EA	SILENCER	SR64	GRY	IVE
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 02D

For use on door(s): 325B

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	FIRE EXIT HARDWARE	FL2114 X 4914A	630	PRE
1 EA	SURFACE CLOSER	4041 EDA (PUSH)	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
1 SET	SMOKE SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 03

For use on door(s): 303A, 303B, 304A

Provide each PR door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
6 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	CLASSROOM SET	93K-7-R-15C	626	BES
1 EA	FLUSH BOLT	FB31P	630	IVE
1 EA	DUST PROOF STRIKE	DP1	630	IVE
2 EA	COORDINATORS	COR X FL	630	IVE
2 EA	SURFACE CLOSER	4041 EDA	689	LCN
2 EA	DOME STOP	FS438	630	IVE
2 EA	DOOR HOLDER	90-4-H-ADJ	630	GLY
1 EA	WEATHERSTRIPPING	MANUFACTURER'S STANDARD		
2 EA	DOOR SWEEP	9600A	ALU	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 03A

For use on door(s): 207C

Provide each PR door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
6 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PASSAGE SET	93K-0-N-15C	626	BES
2 EA	FLUSH BOLT	FB358	630	IVE
1 EA	DUST PROOF STRIKE	DP1	626	IVE
1 EA	SURFACE CLOSER	4041	689	LCN
2 EA	DOME STOP	FS436	653	IVE
2 EA	DOOR HOLDER	903-H-ADJ	630	GLY
2 EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 03B

For use on door(s): 303C

Provide each PR door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
6 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
2 EA	PUSH PLATE	8200-4 X 16	630	IVE
2 EA	PULL PLATE	8303-0 4 X 1630	630	IVE
2 EA	SURFACE CLOSER	4041	689	LCN
2 EA	DOME STOP	FS436	653	IVE
2 EA	DOOR HOLDER	904-H-ADJ	630	GLY
2 EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 03C

For use on door(s): 306A

Provide each PR door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
6 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
2 EA	PUSH PLATE	8200-4 X 16	630	IVE
2 EA	PULL PLATE	8303-0 4X1630	630	IVE
2 EA	SURFACE CLOSER	4041 EDA	689	LCN
2 EA	DOME STOP	FS438	653	IVE
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 04

For use on door(s): 307A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PASSAGE SET	93K-0-N-15C	626	BES
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 04A

For use on door(s): 206A, 207B, 207D, 308A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PASSAGE SET	93K-0-N-15C	626	BES
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

REMOVE THRESHOLD AT DOOR 206A, 207D AND 308A.

Hardware Group No. 04A.1

For use on door(s): 203A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	STOREROOM LOCK	93K-7-D-15C	626	BES
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	NGP

Hardware Group No. 04B

For use on door(s): 301B, 302A, 318A, 325A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 5 X 4.5	630	IVE
1 EA	PASSAGE SET	93K-0-N-15C	626	BES
1 EA	SURFACE CLOSER	4041 (PULL)/4041 EDA (PUSH)	689	LCN
1 EA	DOME STOP	FS438	630	IVE
1 EA	WEATHERSTRIPPING	MANUFACTURER'S STANDARD		
1 EA	DOOR SWEEP	9600A	ALU	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

REMOVE CLOSER AT DOOR 302A AND ADD 16A (NGP) DRIP STRIP.
 REMOVE DOOR SWEEP AND WEATHERSTRIPPING AT DOOR 318A AND ADD 2525B SEALS.
 USE CLASSROOM LOCK ND70PD RHO AT DOORS 301B AND 325A.

Hardware Group No. 04C

For use on door(s): 002A, 003A, 004A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
4 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	STOREROOM	93K-7-D-15C	626	BES
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	NGP

Hardware Group No. 04D

For use on door(s): 303D, 303E

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PUSH PLATE	8200- 4 X 16	630	IVE
1 EA	PULL	8303-0 4 X 16	630	IVE
1 EA	ROLLER LATCH	RL32A-TOP MONT	626	IVE
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	NGP

Hardware Group No. 05

For use on door(s): 207A, 301A (NR), 305A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PASSAGE SET	93-0-N-15C	626	BES
1 EA	SURFACE CLOSER	4041 (PULL)/4041 EDA (PUSH)	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
1 SET	SMOKE SEAL	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

PROVIDE 5 X 4.5 HINGES AT DOOR 301A, THIS DOOR IS ALSO NON-RATED.

Hardware Group No. 06

For use on door(s): 104A, 202B, 208B, 209B

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PRIVACY SET	93-K-0-L 15C	626	BES
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 06A

For use on door(s): 309A, 317A, 322A, 323A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PRIVACY SET	93-K-0-L 15C	626	BES
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	DOME STOP	FS436	630	IVE
3 SET	SEALS	2525B	GRY	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 06B

For use on door(s): 107A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	STOREROOM LOCK	93K-7-D-15C	626	BES
1 EA	DOME STOP	FS436	630	IVE
3 EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 07

For use on door(s): 111A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
4 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	STOREROOM LOCK	45-0-D-15H (LESS CYL)	626	BES
1 EA	CYLINDER	VTQP QUAD SECTION MA SERIES (SDGE)		
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	LATCH GUARD	LG1	630	IVE
1 EA	DOME STOP	FS438	630	IVE
1 EA	WEATHERSTRIPPING	MANUFACTURER'S STANDARD		
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 08

For use on door(s): 008A, 009A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	STOREROOM LOCK	93-K-0-D-15C (LESS CYL@vtqp)	626	BES
1 EA	CYLINDER	VTQP QUAD SECTION MA SERIES (SDGE)	626	
1 EA	SURFACE CLOSER	4041 EDA	689	LCN
1 EA	EXIT HARDWARE	99L-BE x 996L	626	VON
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOME STOP	FS436	630	IVE
1 SET	SMOKE SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

ONLY 3 HINGES REQUIRED AT DOOR 009A WHICH IS ALSO A 3HR RATED DOOR.
 REMOVE PANIC BAR, VTQP CORE AND THRESHOLD AT DOOR 008A.

Hardware Group No. 09

For use on door(s): 105A

Provide each SGL louvered gate with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1HW 5 X 4.5	630	IVE
1 EA	STOREROOM LOCK	45H-7-D-15H	626	BES
1 EA	DOMESTOP	FS438	630	IVE
3 EA	SILENCER	SR64	GRY	IVE
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 10

For use on door(s): 105B

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1HW 5 X 4.5	630	IVE
1 EA	STOREROOM LOCK	45H-7-D-15H	626	BES
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOMESTOP	FS438	630	IVE
1 SET	SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 11

For use on door(s): 201A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
4 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	OFFICE LOCK	93K-7-AB-15C	626	BES
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOMESTOP	FS438	630	IVE
1 SET	SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 12

For use on door(s): 202A, 208A, 209A, 310A, 311A, 312A, 313A, 314A, 315A, 319A, 320A, 321A

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1 EA	PRIVACY SET	93K-0-L-15C	626	BES
1 EA	SURFACE CLOSER	4041	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1 EA	DOMESTOP	FS438	630	IVE
1 SET	SMOKE SEALS	2525B	BRN	NGP
1 EA	THRESHOLD	PER DETAILS	ALU	NGP

Hardware Group No. 13

For use on door(s): 103A

Provide each SGL gate with the following:

Quantity	Description	Model Number	Finish	Mfr
2 EA	DA PIVOT SPRING HINGE	4007MRB	630	MCK

Hardware Group No. 14 FOUR FOLD DOORS

For use on door(s): 101A, 101B, 101C

HARDWARE, SENSORS AND CONTROLS SUPPLIED BY MANUFACTURER, SEE PLANS AND SECTION 08 35 50.

Hardware Group No. 15 NOT USED

Hardware Group No. 16 SLIDING DOOR

For use on door(s): 201B

ALL HARDWARE SUPPLIED BY MANUFACTURER, SEE SECTION 08 32 00.

Hardware Group No. 17 MECHANICAL SCREEN GATE

For use on door(s): 304C

Provide each SGL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
3 EA	HINGE	3CB1HW 4.5 X 4.5	630	IVE
1 EA	SURFACE BOLT	SB453	652	IVE

Hardware Group No. 18 SAFETY GATE

For use on door(s): 110C

Provide each PR door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
4 EA	HINGE	3CB1HW 4.5 X 4.5	630	IVE
	BALANCE OF HDW BY GATE MFR			

* * *

GLASS GLAZING

Section 08 81 00

1. GENERAL:

- A. SUMMARY: Provide Glass and Glazing, as shown and specified per Contract Documents.
- B. REFERENCES:
- American National Standards Institute (ANSI):
 - ANSI/ASTM E330: Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - ANSI Z97.1: Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
 - American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - Glass Association of North America (GANA): "Engineering Standards Manual" and "Glazing Manual".
 - Insulating Glass Certification Council (IGCC): Rating standards.
 - Laminators Safety Glass Association Division of GANA (LSGA): Standards Manual.
 - Sealed Insulating Glass Manufacturers Association (SIGMA): SIGMA No. 64-7-2 - Specification for Sealed Insulating Glass Units.
- C. SUBMITTALS:
- General: Submit product data; a List of Materials proposed for use with each glazing condition identified; samples if specifically requested; and certificates stating that products installed comply with U.S. Consumer Product Safety Commission Standards.
 - Closeout:
 - General: Submit maintenance data.
 - Guarantee:
 - General: Provide in required form for a period of one (1) year from date of final acceptance by City, except as follows:
 - Float Glass: Per requirements of ASTM C1036 and ASTM C1048.
 - Coated-Glass Products: Ten (10) years.
 - Insulating Glass: Five (5) years.
 - Fire Rated Glass: Five (5) years.
 - Laminated Glass: Five (5) years.
 - Sacrificial Anti-graffiti Window Coating Film: Seven (7) years.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
- VOC Materials Compliance:
 - General: Use only products that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 - Adhesives and Sealants: Green Seal Standard GS-13.
 - Window Films: Green Seal Standard GS-14.
 - Manufacture:
 - General: Manufactured by PPG Industries, Inc., Glass Group; unless otherwise indicated.
 - Alternate Manufacturers: Comparable products manufactured by Viracon, Inc., or accepted equal.
 - Tempered Glass and Safety Glazing: Comply with United States Consumer Product Safety Commission's "Safety Standards for Architectural Glazing Materials" (16 CFR part 1201) category I or II, as applicable; CBC Section 2402A and 2406.
 - Flat Glass:
 - General: Clear 7/32 inch thick unless otherwise indicated; size as shown.
 - Float Glass: ASTM C1036, Type 1 transparent flat, Class 1 clear, quality q3 glazing select.
 - Tempered Glass: ASTM C1048, fully tempered with horizontal tempering; 1/4 inch thick minimum.
 - Mirrored Glass: Refer to Section 10 28 13 - TOILET ACCESSORIES for glass in framed mirrors.
 - Insulated Glass Units:
 - General: Double pane with glass elastomer edge seal; outer pane specified Low-E glass, inner pane of 1/4 inch clear glass; inter pane space purged by dry air; total unit thickness of 1 inch; conforming to ASTM E2190 with IGCC class CBA rating.
 - Spandrel: Outer pane specified Ceramic Frit Glass, inner pane of 1/4 inch obscure glass.

- f. Low E Glass:
 - 1. General: EverGreen 8 manufactured by Viracon, Inc.; thickness as shown.
 - 2. Alternate Manufacturers: Comparable products manufactured by PPG Industries, Inc., Glass Group, or accepted equal.
- g. Ceramic Frit Glass:
 - 1. General: Viraspan_No. 5961, Opaque manufactured by Viracon, Inc.; thickness as shown; color and pattern as shown.
 - 2. Alternate Manufacturers: Comparable products manufactured by PPG Industries, Inc., Glass Group, or accepted equal.
- h. Obscure Glass: ASTM C1036, Type II (patterned glass, flat), Class 1 (clear), Form 3 (patterned), Quality q8 (glazing), Finish f1 (patterned one side).
- i. Fire Rated Glass:
 - 1. General: Specified products are manufactured by the Safti Division of O'Keefe's, Inc.
 - 2. Alternate Manufacturers: Comparable products manufactured by Technical Glass Products, or accepted equal.
 - 3. 20 Minute: SuperLite I.
 - 4. Forced Entry 45 Minute: Refer to Section 08 42 53 - FIRE RATED ALUMINUM ENTRANCES.
- j. Laminated Safety Glass: 1/4 inch thick, tinted 14% light transmittance, consisting of two 1/8 inch thick lights laminated with special plastic interlayer between.
- k. Sacrificial Anti-graffiti Window Coating Film:
 - 1. General: HanitaTEK Anti Graffiti XTRA manufactured by Hanta Coatings.
 - 2. Alternate Manufacturers: Comparable products manufactured by Madico, Inc., or accepted equal.
 - 3. Thickness: 6mils.
- 4. Glazing Materials:
 - a. General: Factory mixed materials recommended by glass manufacturer for each glazing condition. Provide glazing and bedding putties to match color of frame, sealants, tapes, and other materials necessary to perform glazing work. Provide setting blocks, shims, compression seals, felt and neoprene or vinyl glazing channels as required.
 - b. Butyl Glazing Tape:
 - 1. General: 440 Tape as manufactured by Tremco, Inc.
 - 2. Alternate Manufacturers: Comparable products manufactured by the GE Sealants and Adhesives, or accepted equal
 - c. Accessories:
 - 1. General: Materials recommended by glass or glazing material manufacturer.
 - 2. Setting Blocks and Spacers: Neoprene chemically compatible with specified sealants.
 - 3. Glazing Points and Spring Wire Clips: Corrosion resistant.
 - 4. Filler Rod: Compressible synthetic rubber or foam.
 - 5. Primer-Sealers and Cleaners: As recommended by glass manufacturer.

3. EXECUTION:

A. PREPARATION:

- 1. Environmental Requirements: Glaze in dry conditions; minimum temperature 40 degrees F during and 48 hours after installation of glazing compounds.
- 2. Examination: Examine conditions of work in place before beginning work; report defects.
- 3. Measurements: Take field measurements; report variance between plan and field dimensions.
- 4. Delivery: Deliver with manufacturer's labels intact; do not remove until completion of final inspection.
- 5. Protection: Protect glass from damage until occupancy of building; replace glass damaged or broken before final acceptance.
- 6. Surface Preparation: Clean contact surfaces with solvent and wipe dry. Seal porous glazing channels or recesses with material compatible with sealer. Prime surfaces scheduled to receive sealant.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Glass:
 - a. Dimensions: As shown; tolerances as recommended by manufacturer.
 - b. Edges: Per referenced standards; nipped edges, or edges treated with abrasives, not acceptable.
- 3. Glazing:
 - a. General: Use glass as shown; glaze with glazing compound or glazing gaskets as required.
 - b. Float Glass: Type and thickness, as shown.
 - c. Tempered Glass:
 - 1. General: Type and thickness, as shown.

2. Heat Absorbing: Install at exterior, as shown.
- d. Insulated Glass Units:
 1. General: Install on exterior, where shown.
 2. Low-E Glass: Install coated surface on inside of insulated glazed units.
 3. Spandrel: Ceramic frit surface on inside of insulated glazed units.
- e. Ceramic Frit Glass: Install where shown.
- f. Obscure Glass: Install where shown.
- g. Laminated Safety Glass: Install where shown.
- h. Fire Rated Glass: Install per UL Certification for rating as shown.
- i. Sacrificial Anti-graffiti Window Coating Film: Install at exterior per manufacturers instructions without bubbles, ripples, drips, dirt, cuts, tears or gaps between film and frame.

* * *

FIXED LOUVERS

Section 08 91 19

1. GENERAL:

- A. SUMMARY: Provide Wall Louvers, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Air Movement and Control Association International, Inc. (AMCA): AMCA 500/N - "Laboratory Method for Testing Louvers for Rating".
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Certificates: Submit AMCA certification for louvers specified.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Metal Wall Louvers:
 - a. General: Extruded Stationary Model No. K609, 45 degree straight louver manufactured by the Airolite Company.
 - b. Alternate Manufacturers: Comparable products manufactured by Construction Specialties, Inc., or accepted equal.
 - c. Size: As shown.
 - d. Primer: FS TT-P-641F, Type II.
 - e. Bituminous Coating: Manufacturer's standard.
 - 2. Bird Screen:
 - a. General: 1/2 inch mesh, 16 gage galvanized steel wire removable screen.
 - b. Frame: Manufacturer's standard.
 - 3. Fasteners: Manufacturer's standard, compatible with fabricated items.
 - 4. Sealant: Refer to Section 07 92 10 - JOINT SEALERS; standard color selected by the Architect.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Metal Wall Louvers:
 - a. General: Install frame and blades plumb, straight and level. Anchor to structure as shown; provide sealant at perimeter for watertight installation.
 - b. Mullions: Anchor top and bottom, as shown.
 - c. Dissimilar Metals: Separate with heavy bituminous coating.
 - d. Finish: Touch-up abrasions to shop prime coat as required; finish provided under Section 09 91 00 - PAINTING.
 - 3. Ductwork: Connect ducts to louvers; refer to Division 23 - HEATING, VENTILATING AND AIR CONDITIONING.
 - 4. Bird Screen: Install at exterior louvers.

* End Division 08 *

Division 09 - FINISHES

SYNTHETIC CEMENT PLASTER

Section 09 24 18

1. GENERAL:

A. SUMMARY: Provide Synthetic Cement Plaster, as shown and specified per Contract Documents.

B. REFERENCES:

1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C1068: Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
2. Northwest Wall and Ceiling Bureau (NWCB): Stucco Resource Guide.
3. Portland Cement Association (PCA): Portland Cement Plaster/Stucco Manual.
4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
5. Western Wall and Ceiling Contractors Association (WWCCA): Exterior Lathing and Plastering Technical Bulletins.

C. SUBMITTALS:

1. General: Submit product data.
2. Samples: Submit manufacturer's standard colors and textured finishes other than smooth.
3. Closeout: Submit maintenance data and guarantee in required form for a period of Ten (10) years from date of final acceptance by City.

2. PRODUCTS:

A. MATERIALS:

1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
2. Synthetic Cement Plaster:
 - a. General: Diamond Wall One Coat System manufactured by Omega Products International, Inc., unless otherwise indicated.
 - b. Alternate Manufacturers: Comparable products manufactured by Parex, Inc., or accepted equal.
 - c. Bonding Agent: BondCrete, liquid polyvinyl bonding agent.
 - d. Primer: AkroFlex Base Primer, acrylic base primer.
 - e. Reinforcement: Reinforcing Mesh; 4.5 ounce, alkali resistant, woven fiber mesh.
 - f. Plaster:
 1. Vertical Construction: Diamond Wall PM Concentrate and Admixture.
 2. Horizontal Construction: StyroGlue Plus Base, 100% polymer based, fiber reinforced, water resistant base coat.
 - g. Finish Coat:
 1. New Surfaces:
 - a) General: AkroFlex Desert Series, 100% acrylic finish.
 - b) Color and Texture: As selected by the Architect.
 2. Repaired Surfaces:
 - a) General: OmegaFlex 100% acrylic finish.
 - b) Texture: Match existing; paint per Section
3. Aggregate: Sand per ASTM C897.
4. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
5. Lath:
 - a. General: Conform to CBC Table 25A-B for lath types, weights, attachments and support spacing, except where otherwise noted.
 - b. Wire Mesh Reinforcement: ASTM C1032 woven wire mesh; 1-1/2 inches x 1-1/2 inches x 17 gage galvanized.
 - c. Expanded Metal Lath: 3.4 lbs. per square foot. Use 3/8 inch riblath where shown and where supports are more than 16 inches and less than 24 inches on center.
 - d. Lathing Accessories:
 1. Fasteners:
 - a) Screws: Galvanized Type S bugle head; sizes as required for application.

- b) Tie Wire: ASTM A641; 18 gage galvanized annealed steel.
- 2. Screeds:
 - a) General: ASTM C1047, size for plaster thicknesses shown manufactured by Stockton Wire Products, Inc.; galvanized steel or zinc alloy for exterior use.
 - b) Comparable products manufactured by California Expanded Metal Co., or accepted equal.
 - c) Casing Beads: CPB Casing Plaster Bead or SFC Short Flange Casing, as shown; with solid flange.
 - d) Expansion Screeds:
 - 1) General: DVG Double V Groove.
 - 2) Corner Reinforcement: Woven or welded galvanized wire or expanded galvanized metal.
 - e) Drip Mold: NTD No. 2 Drip.
- B. MIXES:
 - 1. General: Per manufacturer's directions and CBC; mix only as much plaster as can be used prior to initial set. Combine materials dry, to uniform color and consistency, before adding water. Do not retemper mixes after initial set has occurred.
 - 2. Synthetic Cement Plaster:
 - a. General: Per manufacturer's instructions.
 - b. Finish Coat: Per manufacturer's instructions.

3. EXECUTION:

A. PREPARATION:

- 1. Environmental Requirements: Maintain minimum temperature of materials, substrate and ambient air temperature above 50 degrees F during application and for at least 48 hours after each coat is applied. Do not apply when temperature exceeds 80 degrees F, or during wet or windy weather conditions.
- 2. Examination: Examine conditions of work in place before beginning work; report defects.
- 3. Measurements: Take field measurements; report variance between plan and field dimensions.
- 4. Protection: Protect mixtures from freezing, frost, contamination and evaporation. During installation protect adjacent surfaces from splattering of plaster.
- 5. Surface Preparation: Clean surfaces to receive plaster; remove loose materials and deleterious substances which may impair work.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Rated Assemblies: Per UL and code requirements; one manufacturer for each assembly.
- 3. Backing Paper:
 - a. General: Apply two (2) layers of water vapor permeable (WVP) backing paper over substrate, lap edges 2 inches minimum. Fasteners/penetrations not allowed at sloped portions of wall offsets.
 - b. Self-Sealing Underlayment: Apply at horizontal surfaces, surfaces up to 30 degrees from horizontal plane, and where shown; refer to Section 07 60 00 - FLASHING AND SHEET METAL.
- 4. Lath Application:
 - a. General: Apply per ASTM C1063 taut, with long dimension perpendicular to supports. Lap ends minimum 1 inch; secure with tie wire where laps occur between supports. Lap sides minimum 1-1/2 inches.
 - b. Lath Attachment:
 - 1. Metal Supports: Attach metal lath using screws and tie wire at maximum 6 inches on center.
 - 2. Concrete Supports: Attach metal lath with wire hair pins, hooks, or loops at maximum 24 inches on center.
 - c. Lathing Accessories:
 - 1. General: Provide backing for proper attachment of lathing accessories; at butt joints connect with "Connector Clips" and set in bed of sealant.
 - 2. Grounds and Casing Beads: Apply in long lengths; straight, plumb and true; wherever plaster adjoins other materials, and around openings, including electrical boxes. Secure with wire ties at 7 inches on center.
 - 3. Expansion Screeds: Install at double studs and/or solid backing, in closed position, as recommended by manufacturer.
 - 4. Penetration Collars: Install at penetrating elements; seal penetrating element with caulking per 07 92 10 - JOINT SEALERS.
 - d. Exterior Soffits: Per CBC, Section 2506A and as specified.
- 5. Bonding Agent: Apply where indicated per manufacturer's recommendations.

7. Reinforcement: Apply where shown.
8. Plaster Application:
 - a. General: Finish surfaces smooth and even, to within tolerance of 1/8 inch in 10'-0" per manufacturer's instructions.
 - b. Application Method: By hand or machine; limit machine application to base coats.
 - c. Plaster Thicknesses: As shown; measured from plaster base face to finished plaster surface.
 - d. Finish Coat: Apply product specified to surface indicated, per manufacturer's directions.
9. Curing: As recommended by manufacturer based on environmental conditions at time of cure.
- C. FIELD QUALITY CONTROL: Work containing cracks, blisters, pits, checks, and discoloration will not be accepted. Remove and replace with new work; defective work may be patched when permitted; patch to match existing work.

* * *

GYPSUM BOARD

Section 09 29 00

1. GENERAL:

- A. SUMMARY: Provide Gypsum Board, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C11: Terminology Relating to Gypsum and Related Building Materials and Systems.
 - c. ASTM C840: Specification for Application of Gypsum Board.
 - 2. Gypsum Association (GA):
 - a. GA-214: Recommended Levels of Gypsum Board Finish.
 - b. GA-216: Recommended Specifications for the Application and Finishing of Gypsum Board.
 - c. GA-600: Fire Resistance Design Manual.
 - 3. Intertek Testing Services (ITS): Certification Listings.
 - 4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Fire Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated per ASTM E119 by an independent testing laboratory and acceptable to the jurisdictional authorities.
 - 2. Sound (STC) Rated Assemblies:
 - a. General: Provide gypsum board assemblies with STC ratings shown; provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.
 - b. STC-Rated Assemblies: Design designations from GA-600 Section III - Sound Control.
 - 3. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory.
 - 2. Manufacture:
 - a. General: Products manufactured by the Gold Bond Building Products Division of the National Gypsum Corp., unless otherwise indicated.
 - b. Alternate Manufacturers: Comparable products manufactured by the United States Gypsum Co., or accepted equal.
 - 3. Gypsum Wallboard:
 - a. General: Gold Bond Gypsum Wallboard conforming to ASTM C1396; tapered edge where joint finish is required; 5/8 inch thickness, unless otherwise shown.
 - b. Surface Paper: 100% recycled content paper on front, back and long edges.
 - c. Fire-resistant: Gold Bond Gypsum Fire-Shield "Type X" fire-rated, with UL label; use throughout unless otherwise shown.
 - d. Moisture and Mold Resistant: e2XP Extended Exposure Interior Extreme conforming to ASTM C1658 and applicable sections of ASTM C1396.
 - e. Gypsum Board for Laminating at Small Radius Curves: 1/4 inch High Flex Gypsum Wallboard manufactured to bend to fit a tight radius.
 - f. Impact Resistant: Hi-Impact XP Wallboard.
 - g. Gypsum Sheathing: Gold Bond Gypsum Sheathing conforming with ASTM C1396; "Type X", or approved equal; 2'-0" x 8'-0" x 5/8 inch, tongue and groove edge, fire rated with UL label.
 - 4. Resilient Furring Channels: RC-1.
 - 5. Acoustical Insulation:
 - a. General: Refer to Section 07 21 00 - THERMAL INSULATION.
 - b. Acoustic Sealer Pads: As recommended by insulation manufacturer.
 - 6. Control Joints, Corner Beads and Casing: Manufacturer's standard galvanized steel at exterior corners and L-shaped casing without back flange.
 - 7. Joint System Materials:
 - a. General: ASTM C475.

- b. Tape: ProForm Paper Joint Tape.
 - c. Joint Compound: ProForm All Purpose Ready Mix Joint Compound.
 - d. Joint Finishing Compound: ProForm Ready Mix Topping Joint Compound.
 - e. Texture: As recommended by manufacturer for type of use and level of finish specified.
8. Fasteners:
- a. Screws:
 - 1. General: ASTM C954, Type W drywall screws; provide a minimum of $\frac{3}{4}$ inch penetration into wood framing.
 - 2. Metal Studs and Furring Channels: ASTM C1002, phillips, flat head, recessed, bugle shaped, self drilling, self tapping, rust inhibitive coated steel screws.
 - b. Nails:
 - 1. General: ASTM C514; phosphate etched, concave head, steel wire nails, specially made for attachment of gypsum board.
 - 2. $\frac{1}{2}$ Inch Board: 1- $\frac{3}{8}$ inches long, 14 gage.
 - 3. $\frac{5}{8}$ Inch Board: 1- $\frac{7}{8}$ inches long, 13 gage.
 - 4. Double Layer $\frac{1}{2}$ Inch Board: 2- $\frac{1}{4}$ inches long, 12 gage.
 - 5. Gypsum Sheathing: 1- $\frac{5}{8}$ inch galvanized roofing nails.
 - c. Fasteners to Impact Resistant Wallboard: As recommended by manufacturer.
9. Interior Wall Sealant:
- a. General: Acoustical Sealant as manufactured by the Sealant/Weatherproofing Division, Tremco, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the Pecora Corp., or accepted equal.

3. EXECUTION:

A. PREPARATION:

- 1. Scheduling: Where gypsum wallboard and sprayed fireproofing are to be installed in the same area, install attachment clips for wallboard to metal framing before application of fireproofing.
- 2. Environmental Requirements: Do not install wallboard or joint compounds if building temperature is below 55 degrees F. Provide proper ventilation to eliminate excessive moisture from building.
- 3. Examination:
 - a. General: Examine conditions of work in place before beginning work; report defects.
 - b. Framing: Verify accurate spacing and alignment; refer to Section 05 41 10 - METAL STUD FRAMING.
- 4. Measurements: Take field measurements; report variance between plan and field dimensions.
- 5. Delivery: Stack wallboard flat, off the ground, properly supported and protected from weather; use protective covering.
- 6. Protection: Protect edges and surfaces from construction damage and soiling.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Fire Rated Assemblies: Per UL and applicable code requirements. Use only one manufacturer's products in the fabrication of each assembly, unless otherwise permitted by code.
- 3. Acoustical Requirements:
 - a. General: Refer to Section 07 21 00 - THERMAL INSULATION.
 - b. STC-Rated Assemblies: Seal assembly at both faces of partitions at perimeter and through penetrations, and behind control and expansion joints with a continuous bead of acoustical sealant. Comply with ASTM C919 and manufacturer's recommendations for locating edge trim and closing off potential sound paths around or through assemblies, including sealing partitions above acoustical ceilings.
 - c. Acoustic Sealer Pads: Install over backs and sides of electrical junction boxes and at wall penetrations where acoustical insulation is shown.
- d. Cut Outs and Penetrations:
 - 1. General: Cut-outs are to be regular and not fracture core or tear covering of gypsum board and meet the following requirements.
 - 2. Minimize penetrations of insulated wall and ceiling constructions. Penetrate only where necessary and fully seal airtight at the perimeter using acoustical sealant.
 - 3. Where ducts and piping greater than 3-inches diameter penetrate insulated wall or ceiling construction, provide a clearance of 1-inch + $\frac{1}{4}$ -inch at the perimeter of the penetration.
 - 4. Where conduit piping 3-inches diameter and less (including mechanical, hydraulic, plumbing, etc.) pass through insulated wall or ceiling construction, provide a clearance of $\frac{1}{4}$ -inch + $\frac{1}{8}$ -inch between the conduit or piping and the structure, unless otherwise shown.
 - 5. After the ductwork, conduit or piping has been installed, repair the gypsum board to meet the minimum perimeter clearance to the specified tolerance as required. Where the clearance

- exceeds 3/4-inch, provide a sheet metal sleeve within the partition packed with safing insulation batts and caulk both sides airtight with an acoustical sealant. Where the perimeter clearance exceeds 3/8-inch, use a flexible backing rod to caulk against.
6. Where penetration clearances are 3/8-inch or less, caulk airtight with acoustical sealant at gypsum board.
 7. Gypsum board penetrations (including those resulting from wiring, cables, and electrical junction boxes) are to be sealed airtight with acoustical sealant.
4. Gypsum Wallboard:
- a. Sheet Arrangement Layout: Install as shown; use long sheets to restrict joints to minimum.
 - b. Cutting and Scribing:
 1. General: Cut neatly to fit around outlets, switch boxes and other protrusions.
 2. Moisture Resistant Gypsum Board: Treat cut edges and holes with sealant.
 - c. Joints: Butt sheets loosely together with tapered edges placed together; butt edges placed next to tapered edges are not acceptable. Sand or kerf cut edges and mill ends to provide smooth jointing on exposed face. Stagger end joints. Shim wallboard as required to provide even joints, without offsets.
 - d. Fasteners:
 1. General: Place not less than 3/8 inch from edges of board, with heads dimpled slightly below surface; do not cut through paper.
 2. Ceilings, Non-rated: Screws, 12 inches on center.
 3. Walls, Non-rated: Screws, 12 inches on center.
 4. Ceilings, One-hour Rated: As shown.
 5. Walls, One-hour Rated: As shown.
 - e. Trim: Place control joints consistent with lines of building; corner beads at exterior corners; and casing beads where wallboard abuts other materials, and as shown.
 - f. Interior Wall Sealant: Install double bead of sealant at floor, wall intersections, where walls abut other materials, electrical boxes and any other penetrations of interior partitions.
 - g. Partitions:
 1. General: Place boards with long dimensions either vertical or horizontal on studs; stagger vertical joints on opposite sides of partitions; keep end joints to minimum. Locate joints a minimum of 12 inches from jambs of openings.
 2. Deflection: Where gypsum board is carried full height of wall to the structure above, undercut the board by 3/8 inch and seal the top edge of the board to structure with continuous bead of sealant.
 - h. Ceilings:
 1. General: Install boards with long dimension at right angles to supports; end joints, perimeter of ceiling and edge of openings over solid bearing members.
 2. One (1) Hour:
 - a) General: As shown.
 - b) Fixture Enclosures: 5/8 inch thick UL labeled wallboard around fixtures.
5. Finishing:
- a. General: Finish joints, fastener depressions, applied metal trim and surface blemishes per manufacturer's directions.
 - b. Finished Wallboard: Sand as necessary to provide flat, smooth surface ready for decoration.
 - c. Concealed Wallboard: Wallboard covered by panels or wall-fastened casework, and wallboard above level of finished ceiling, does need to be sanded smooth.
 - d. Surface Finishes:
 1. General: Finish gypsum board in compliance with GA 214 requirements. Apply Level 4 - Smooth finish, unless otherwise noted.
 2. Food Preparation Spaces, Toilet and Janitor Rooms: Level 5 - Smooth finish.
 - e. Tolerances:
 1. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 2. Maximum Variation: 1/8 inch in 10'-0" in any direction.
- C. CLEANING:
1. General: Remove debris, scraps, spillage, overspray and dust from surfaces to receive subsequent finishes.
 2. Waste Management: Separate clean waste gypsum products from contaminants per Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.

* * *

TILING

Section 09 30 00

1. GENERAL:

- A. SUMMARY: Provide Tiling, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American National Standards Institute (ANSI): ANSI/TCNA A108.1B - Installation of Ceramic Tile with Portland Cement Mortar.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. International Association of Plumbing and Mechanical Officials (IAPMO): Waterproof membrane certification.
 - 4. Portland Cement Association (PCA): Portland Cement Plaster/Stucco Manual.
 - 5. Tile Council of North America (TCNA): Handbook for Ceramic Tile Installation.
 - 6. Steel Stud Manufacturers Association (SSMA): Product Technical Information - Specifications for lathing and furring.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Samples:
 - a. Ceramic Tile: Submit each type, class and color.
 - b. Grout: Submit manufacturer's standard colors.
 - 3. Certificates: Submit Master Grade Certificate per ANSI/TCA A137.1, from tile manufacturer for each type of tile installed.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by City.
 - 5. Extra Stock: Deliver one (1) percent or a minimum of one full container of each kind and type of tile installed.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Ceramic Tile:
 - a. General: Specified products are manufactured by Dal-Tile International, unless otherwise indicated.
 - b. Alternate Manufacturers: Comparable products manufactured by the Crossville Ceramics, Inc., or accepted equal.
 - c. Manufacture: Conform to ANSI A137.1.
 - d. Interior Tile:
 - 1. Unglazed Wall, Base, and Trim:
 - a) General: Natural Hues Standard Grade, unglazed mosaic tile; cushion edges, satin matte finish; standard colors selected by the Architect, as shown.
 - b) Trim Units: Matching trim and other shapes as required.
 - c) Shapes and Sizes: Flat; size and shape as shown x 5/16 inch.
 - d) Mounting: Dot type adhesive.
 - 2. Bullnose Base:
 - a) General: Terra Elements manufactured by Terra Green Ceramics.
 - b) Alternate Manufacturers: No known equal.
 - c) Size: 6 inches x 8 inches
 - d) Color: Earth.
 - 3. Specialty Wall Tile
 - a) General: Subway Series manufactured by Arizona Tile.
 - b) Alternate Manufacturers: No known equal.
 - 3. Setting Bed:
 - a. General: Specified products are manufactured by the United States Gypsum Co.
 - b. Alternate Manufacturers: Comparable products manufactured by the Gold Bond Building Products Division of the National Gypsum Corp., or accepted equal.
 - c. Lath:
 - 1. General: ASTM C847, flat diamond, 2.5 lbs. per square yard.
 - 2. Expanded Metal Lath: Conform to CBC Chapter 25 for lath types, weights, attachments and support spacing, except where otherwise noted.

- d. Lathing Accessories:
 - 1. Fasteners:
 - a) Nails: Common wire, galvanized 12 gage, diamond point, 1-1/2 inches long.
 - b) Screws: ASTM C954, Type W; provide a minimum of ¼ inch penetration into wood framing.
 - c) Hook Staples: 1/2 inch wide x 1-1/2 inches long, No. 9 gage ring shank, hook staple.
 - d) Tie Wire: 18 gage galvanized annealed steel.
 - 2. Screeds: ASTM C1047, galvanized steel.
 - e. Cement Plaster:
 - 1. Cement: ASTM C150, Type I, Portland.
 - 2. Lime: ASTM C207, Type S.
 - 3. Aggregate: Sand per ASTM C897.
 - 4. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
 - 4. Grout Joint Filler:
 - a. General: Prism Surecolor Grout manufactured by Custom Building Products, color selected by the Architect.
 - b. Alternate Manufacturers: Comparable products manufactured by Super Stone, Inc., or accepted equal.
 - 5. Sealants: As specified in Section 07 92 10 - JOINT SEALERS.
 - 6. Curing Paper: FS UU-P-790, Type II, Grade E, Style 8.
- B. MIXES:
- 1. General: Per ASTM C926; mix only as much plaster as can be used prior to initial set. Protect mixtures from freezing, frost, contamination, and evaporation. Do not retemper mixes after initial set has occurred.
 - 2. Cement Plaster Mortar: Comply with requirements of referenced standards, including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars of uniform quality with optimum performance characteristics for application shown.
 - 3. Grout Joint Filler: Per manufacturer's recommendations.

3. EXECUTION:

- A. PREPARATION:
- 1. Scheduling: Do not apply floor tile in space requiring wall tile until wall tile setting is complete.
 - 2. Environmental Requirements: Maintain minimum temperature of materials, substrate and ambient air temperature above 50 degrees F during application and for at least 48 hours after each coat is applied. Do not apply when temperature exceeds 80 degrees F, or during wet or windy weather conditions.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.
 - 4. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 5. Protection: Protect adjacent surfaces from splattering of plaster during installation and from damage during subsequent construction. Remove cracked, broken, and damaged tiles; replace with new.
 - 6. Surface Preparation:
 - a. General: Verify that surfaces to receive tile are completely clean and free of material that might affect the adhesion of either grout bed set or adhesive applied tile.
 - b. Moisture Testing: Per ASTM F1869; proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water per 1000 square feet in 24 hours.
- B. INSTALLATION:
- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Workmanship:
 - a. General: Comply with TCNA "Handbook for Ceramic Tile Installation", for applicable substrate conditions.
 - b. Mortar Bed:
 - 1. General: TCNA F112 and ANSI/TCNA A108.1.
 - 2. Wall Tile: TCNA W231 and ANSI/TCNA A108.01.
 - 3. Exterior: Flush with surrounding materials, as shown.
 - c. Joints for Vertical and Horizontal Tile Surfaces: TCNA EJ171.
 - d. Grout: ANSI 108.10.
 - 3. Cutting:
 - a. General: Do not use cut tile smaller than half size; use cut tile on outer edges of field only.
 - b. Smoothing: Level cut edges with carborundum stone; install no tile with jagged or flake edges.

4. Wall Tile:
 - a. General: Apply tile to firm, level, plumb, and square surfaces. Lay tile with minimum number of cut tiles; tiles less than one-half size in either face not permitted.
 - b. Corners: Round outside; square inside.
 - c. Joints: Align with floor tile; 1/4 inch wide.
 - d. Setting Method:
 1. General: Install per ANSI/TCNA 108.1 and as specified. Provide where shown.
 2. Thickness; Setting Bed Mortar: Including scratch coat; 3/4 inch thick minimum.
 - e. Penetrations: Fit tile closely around penetrations and where edges will be covered by trim, escutcheons or other similar devices.
 - f. Sealant: Fill joints between wall tile and plumbing and other built-in fixtures with silicone rubber sealant of color to match tile.
5. Bench Tile:
 - a. General: Center field work in both directions to permit laying pattern with a minimum of cut tiles. Lay tile from center lines outward; make adjustments at walls. Tiles less than one-half size in either face not permitted. Slope to floor drains as required.
 - b. Corners: Round outside; square inside.
 - c. Joints: Align with wall tile; 1/4 inch wide.
 - d. Setting Method: Install per ANSI/TCNA 108.1 and as specified. Provide where shown.
6. Grouting: Grout joints full; make smooth and flush; remove excess.
7. Sealant: Fill joints between floor tile and plumbing and other built-in fixtures with urethane or polysulfide sealant of color to match tile.
8. Allowable Tolerances:
 - a. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 - b. Setting Bed Method:
 1. General: Maximum deviations from level and plumb, and from elevations, locations, slopes, and alignments shown.
 2. Bench: Any direction, 1/8 inch in 10'-0"; 1/32 inch offset.
 3. Walls: Any direction, 1/8 inch in 8'-0"; 1/32 inch offset.
9. Curing:
 - a. General: Per referenced standards; keep damp for at least 72 hours.
 - b. Horizontal Surfaces: Cover areas with curing paper.
- C. CLEANING: Upon completion clean per ANSI 108.1 and 108.4.

* * *

ACOUSTICAL CEILINGS

Section 09 51 00

1. GENERAL:

- A. SUMMARY: Provide Acoustical Ceilings, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Ceiling and Interior Systems Construction Association (CISCA): Acoustical Ceilings, Use and Practice.
 - 3. ICC Evaluation Service Inc.: AC156 - Acceptance Criteria for Seismic Qualification Testing of Non-structural Components.
 - 4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Shop Drawings: Submit shop drawings showing suspension system details and reflected ceiling plans indicating location of light fixtures, mechanical air supply and return outlets and other items affecting ceiling construction. Identify locations of types of suspension systems and types of panels or tile including access panels, where required.
 - 3. Samples:
 - a. Acoustical Board: Submit manufacturer's standard color range.
 - b. Suspension System: Submit manufacturer's standard color range.
 - 4. Certificates: Manufacturer's certified test reports for each specified NRC and STC requirement.
 - 5. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
 - 6. Extra Stock: Deliver one (1) percent or a minimum of one full container of each kind and type of acoustical material installed.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Manufacture:
 - a. General: Specified products are manufactured by Armstrong World Industries, Inc. - Ceilings, unless otherwise indicated.
 - b. Alternate Manufacturers: Comparable products manufactured by USG Interiors, Inc., or accepted equal.
 - 2. Acoustical Ceilings:
 - a. Acoustical Panels:
 - 1. Type 1: Metalworks SequireLock 2x2 perforated lay-in panels, Item No. 5488P4WH, 80 NRC minimum, including accessories as shown; ASTM E84, Class A, flame spread 25, smoke developed 50 or less; fire Class A per ASTM E1264.
 - 2. Type 2: Bioacoustic Tierra 2x2 perforated lay-in panels, Item No. 3460, 85 NRC minimum, including accessories as shown; ASTM E84, Class A, flame spread 25, smoke developed 50 or less; fire Class A per ASTM E1264.
 - b. Ceiling Suspension System:
 - 1. General: Prelude XL 5/16 inch Exposed Tee heavy duty system of exposed steel components.
 - 2. Hanger Wires: No. 12, minimum, galvanized, soft-annealed mild steel wire of gage certified by load test data as capable of carrying five (5) times design load.
 - 3. Compression Struts:
 - a) General: "Donn Compression Post" manufactured by the United States Gypsum Corp.
 - b) Alternate Manufacturers: No known equal.
 - 4. Fasteners: Manufacturer's standard.
 - 3. Acoustical Sealant: As recommended by acoustical material manufacturer; refer to Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Do not begin installation until building is enclosed, dust-generating activities have terminated, and overhead work is completed, tested and approved.
 - 2. Environmental Requirements: Maintain temperature approximating operational conditions, before, during and after installation; humidity not more than 70%.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.

4. Measurements: Take field measurements; report variance between plan and field dimensions.
 5. Surface Preparation: Comply with ASTM C636 Article 3, Interference of Ceiling Related Components; coordinate requirements with other trades. Verify that required work has been installed above ceiling and that perimeter wall work, where ceiling abuts, is completed and dry.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Ceiling Suspension System:
 - a. General: Conform to ASTM C636 and ASTM E580, and suspension system manufacturer's instructions. Erect ceiling system level within 1/8 inch in 12'-0" tolerance when measured in any direction, non-cumulatively; main runners at 4'-0" on center, with support wires at 4'-0" on center, maximum; exposed members parallel with one another, in grid layout as shown.
 - b. Fire Rated Assemblies:
 1. General: Provide UL listed, State Fire Marshal approved, steel grid system with acoustical panels to meet fire endurance rating for combined suspended acoustical ceiling and floor or roof assemblies, as shown.
 2. Hold-Down and Access Clips: Fasten panels securely with hold-down clips; install access clips where removal of panels is required for access to equipment above ceiling.
 - c. Splices and Intersections: Install with interlocking device that draws members tightly together and prevents torsional deflection.
 - d. Compression Struts: Install as shown.
 - e. Perimeter Molding and Grid: Install intersections so fastenings are concealed, as shown.
 - f. Tolerances: Erect ceiling system level within 1/8 inch in 12'-0" in any direction.
 3. Acoustical Panels: Install in ceiling suspension system; pattern and placement as shown.
- C. ADJUSTMENT:
1. General: Adjust sags or twists which develop in ceiling systems; replace improperly installed or damaged suspension system components and acoustical panels, as directed by the Architect.
 2. Tolerances:
 - a. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 - b. Maximum Variation from Flat and Level Surface: 1/8 inch in 12'-0", including integral mechanical and electrical components.
 - c. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

* * *

METAL CEILINGS

Section 09 54 60

1. GENERAL:

- A. SUMMARY: Provide Metal Ceilings, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM C423: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - c. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data, and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. Recycled Metal Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 20% (based on cost) of the total value of the materials for the project.
 - 2. Metal Ceilings:
 - a. General: Alpro Pattern C manufactured by the Alpro Acoustical Systems Division of Gordon, Inc.
 - b. Alternate Manufacturers: No known equal.
 - c. Metal Panels:
 - 1. General: Smooth .032 inch thick corrugated aluminum panels.
 - 2. Sound Absorption Material: Manufacturer's standard 2 inch thick fiberglass with an ASTM C423 noise reduction coefficient of no less than 1.0.
 - 3. Flame Spread: ASTM E84 Class A.
 - d. Suspension System: Manufacturer's standard.
 - e. Finish: Manufacturer's standard powder coating, color selected by the Architect.
 - 3. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Do not begin installation until building is enclosed, dust-generating activities have terminated, and overhead work is completed, tested and approved.
 - 2. Environmental Requirements: Maintain temperature approximating operational conditions, before, during and after installation; humidity not more than 70%.
 - 3. Examination: Examine conditions of work in place before beginning work; report defects.
 - 4. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 5. Surface Preparation: Verify that required work has been installed above ceiling and that perimeter wall work, where ceiling abuts, is completed and dry.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Ceiling Suspension System: Erect ceiling system level within 1/8 inch in 12'-0" tolerance when measured in any direction, non-cumulatively; main runners at 4'-0" on center, with support wires at 4'-0" on center, maximum; exposed members parallel with one another, in grid layout as shown.
- C. ADJUSTMENT:
 - 1. General: Adjust sags or twists which develop in ceiling systems; replace improperly installed or damaged suspension system components as directed by the Architect.
 - 2. Tolerances:
 - a. General: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 - b. Maximum Variation from Flat and Level Surface: 1/8 inch in 12'-0".

RESILIENT FLOORING

Section 09 65 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Resilient Flooring, as shown and specified per Contract Documents.

B. REFERENCES:

1. American National Standards Institute (ANSI): ANSIA117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People.
2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.

C. SUBMITTALS:

1. General: Submit product data.
2. Samples:
 - a. General: Submit manufacturer's standard colors.
 - b. Metal Edge Strips: Submit specified finish.
3. Closeout: Submit maintenance data, extra stock and guarantee in required form for a period of five (5) years from date of final acceptance by City.

D. QUALITY ASSURANCE:

1. Qualifications:
 - a. General: Installer specializing in the work of this Section with minimum three (3) years documented experience.
 - b. Sheet Vinyl: Installer manufacturer trained and approved.

2. PRODUCTS:

A. MATERIALS:

1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
2. Resilient Flooring:
 - a. General: Marmoleum Collection manufactured by Forbo Linoleum Co., Inc.; unless otherwise indicated.
 - b. Alternate Manufacturers: Comparable products manufactured by Azrock Division, Domco Tarkett Commercial, or accepted equal.
 - c. Linoleum:
 1. Tile: Marmoleum Dual; provide in colors as shown.
 2. Sheet:
 - a) General: Marmoleum Dutch Design; Edward VanVliet MO312.
 - b) Bulletin Board: Bulletin Board; Gray 2182. Provide custom sizes and edging as shown.
3. Athletic Flooring:
 - a. General: RB Athletic Flooring manufactured by RB Rubber Products, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by Encore International, or accepted equal.
 - c. Thickness: 3/4 inch.
4. Resilient Base:
 - a. General: 700 Series wall base manufactured by the Roppe Corp.; color as selected by the Architect.
 - b. Alternate Manufacturers: Comparable products manufactured by Johnsonite, Inc., or accepted equal.
5. Edging Strips:
 - a. General: Transitional Moldings manufactured by the Burke/Mercer Flooring Products Division of Burke Industries, Inc.; color as selected by the Architect.
 - b. Alternate Manufacturers: Comparable products manufactured by Johnsonite, Inc., or accepted equal.
 - c. Resilient Flooring to Concrete: Model No. 170.
6. Adhesives: Moisture and alkali resistant, as recommended by flooring manufacturer.
7. Patching and Leveling Compounds: As recommended by manufacturer.
8. Wax: ASTM D4078, 16 percent concentration; slip-resistant, water emulsion base.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Do not lay flooring until other work that might cause damage to flooring is complete.

2. Environmental Requirements:
 - a. General: Minimum temperature of building and materials maintained at 65 degrees F for 24 hours prior to and during installation, and until adhesives have cured.
 - b. Moisture: Do not apply materials on wet or damp surfaces.
 3. Examination:
 - a. General: Examine conditions of work in place before beginning work; report defects.
 - b. Concrete Subfloors: Verify that slabs comply with ASTM F710. No extra payment for work additional to that shown and/or specified, for complete application of resilient flooring, will be allowed if such additional work is apparent from inspection of existing premises and conditions.
 4. Measurements: Take field measurements; report variance between plan and field dimensions.
 5. Surface Preparation:
 - a. General: Clean subfloors; patch and level cracks, holes, depressions and other imperfections per manufacturer's directions.
 - b. Moisture Testing: Per ASTM F1869; proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water per 1000 square feet in 24 hours.
 - c. Existing Subsurfaces: Prepare existing subfloors as required to receive resilient flooring; remove existing flooring and adhesive.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Tolerances: Refer to Section 01 43 00 - QUALITY ASSURANCE.
 3. Adhesive Application: Per adhesive manufacturer's directions; do not exceed working area or time limits stated by manufacturer.
 4. Sheet Linoleum: Install with minimum number of tight, hairline seams. Loose floor covering, open seams, voids under covering, raising and puckering at joints or seams, or telegraphing of adhesive spreader marks through floor covering is not acceptable. Seamless installation is required when roll width is sufficient to cover the width of room.
 5. Linoleum Tile:
 - a. General: Install wall to wall and to fixed cabinets and casework and under freestanding equipment; cut neatly to and around permanent fixtures.
 - b. Layout: Lay from centerline, square and parallel, with straight unbroken joint lines; install partial tiles of equal width at opposite sides of room, as required; less than half-tile width not acceptable.
 - c. Pattern: Alternate direction of tile pattern for each abutting tile in line. Fit tightly and accurately to vertical surface with clean cuts.
 - d. Bulletin Board: Install per manufacturers instructions; provide custom sizes and edging as shown.
 6. Athletic Flooring: Install per manufacturers instructions, as shown.
 7. Resilient Base:
 - a. General: Install on surfaces as scheduled, including cabinet bases and other equipment. Provide cove base typically, carpet base at carpeted floors.
 2. Application: Set straight and level, joints closely fitted and flush; top and bottom edges in firm, full contact with floor and back bonded to wall. At masonry, v-joints in concrete, or similar irregular surfaces, fill voids at top edge of base with adhesive filler material as recommended by base manufacturer. Protect adjacent surfaces from adhesive staining.
 8. Edging Strips: Provide at transitions of floor covering material.

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RESILIENT FITNESS FLOORING

Section 09 65 70

1. GENERAL:

- A. SUMMARY: Provide Resilient Fitness Flooring, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Shop Drawings: Submit manufacture and installation details for review.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum five (5) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Resilient Fitness Flooring:
 - a. General: Structure Runway Tile TM 917 Spectrum recycled rubber flooring tile distributed by To Market, LLC.
 - b. Alternate Manufacturers: No known equal.
 - c. Size: 4'-0" x 50'-0" rolls.
 - d. Thickness: 10mm.
 - e. Wall Wainscot:
 - 1. General: Atmosphere Structure Tile TM 903 Diamante Silver recycled rubber.
 - 2. Size: 38 inch x 38 inch Straight Edge Tiles.
 - 3. Thickness: 4mm.
 - 3. Floor Sealant:
 - a. General: Moxie Flooring Sealer II manufactured by Moxie International, Inc.
 - b. Alternate Manufacturers: No known equal.
 - 4. Patching and Leveling Compounds: As recommended by manufacturer.
 - 5. Adhesive: Manufacturer's standard.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Surface Preparation: Clean dust and debris from subfloor before beginning installation of flooring.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Floor Sealant: Apply in strict conformance with manufacturer's instructions.
 - 3. Fitness Flooring:
 - a. General: Lay per manufacturer's directions.
 - b. Cutouts: Provide holes and necessary reinforcement for anchorage of standards and inserts as shown.
 - 4. Wall Wainscot:
 - a. General: Install per manufacturers directions; attach using contact cement and concealed screws.
 - b. Cap: Install with concealed fasteners at top of wainscot.

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PAINTING

Section 09 91 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Painting, as shown and specified per Contract Documents.

B. REFERENCES:

1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section.
 - b. ASTM D16: for interpretation of terms used in this Section.
2. Master Painters Institute (MPI): Painting Manuals.
3. National Association of Corrosion Engineers (NACE): Standards for priming and painting preparation.
4. National Paint and Coatings Association (NPCA): Guide to U.S. Government Paint Specifications.
5. Painting and Decorating Contractors of America (PDCA): Painting - Architectural Specifications Manual.
6. Scientific Certification Systems (SCS):
 - a. General: Scientific Certification Systems for Indoor Advantage.
 - b. SCS SP-01: Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints
7. Steel Structures Painting Council (SSPC): Steel Structures Painting Manual.

C. SUBMITTALS:

1. General: Submit product data and a certificate stating compliance with federal, state and local VOC regulations.
2. Samples:
 - a. General: Submit manufacturer's standard colors for each surface finishing product specified.
 - b. Field Samples:
 1. General: In place, on material scheduled to be finished, illustrating coating color, texture and finish. Locate where directed; accepted sample may remain as part of the Work.
 2. Size: 8'-0" x 8'-0" panel, or one (1) entire unit as scheduled to be finished.
3. Closeout:
 - a. General: Submit maintenance data.
 - b. Extra Stock: Deliver one percent (1%) or a minimum of one (1) gallon of each color, type and surface texture of paint installed. Label each container with color, type, texture and room locations.
 - c. Guarantee:
 1. General: Provide in required form for a period of one (1) year from date of final acceptance by City.
 2. Criteria: Color and finish appearance shall remain unchanged throughout entire guarantee period.

D. QUALITY ASSURANCE:

1. Applicator: Specializing in performing the work of this Section with minimum three (3) years documented experience.
2. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by state and local jurisdictional regulations.

2. PRODUCTS:

A. MATERIALS:

1. VOC Materials Compliance:
 - a. General: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and the following:
 - b. Paints and Coatings: Green Seal Standard GS-11.
 - c. Recycled Content Latex Paint: Green Seal Standard GS-43.
 - d. Stains and Finishes: Green Seal Standard GS-47.
2. Manufacture:
 - a. General: Specified products are premium grade products of the Frazee Paint Co., unless otherwise indicated.
 - b. Alternate Manufacturers: Comparable products manufactured by the Kelly-Moore Paint Co., Inc., or accepted equal.
 - c. Container Label: Identify with manufacturer's name, and include description of type of paint, brand name, lot number, brand code and color designation.

3. Paint Materials:
 - a. General: Provide manufacturer's standard ready mixed products, except field catalyzed coatings. Provide accessory materials such as linseed oil, shellac, thinners, cleaners and other materials not specifically indicated but required to achieve finishes specified.
 - b. Patching Material: Latex type as recommended by manufacturer.
 - c. Primer:
 1. Concrete Block (Filler): UltraTech C302.
 2. Metal (Acrylic): UltraTech C305.
 3. Metal (Water-based): UltraTech C309.
 4. Metal (Galvanized): No. 6750424 Low VOC Gray Shop Primer.
 5. Metal (Zinc Chromate): No. 750426 Low VOC Red Oxide.
 6. Wood: UltraTech C312.
 7. Exterior:
 - a) Concrete & Masonry Sealer (Epoxy): UltraTech C251.
 - b) Wood (Semi-transparent Stain): 385 Madera.
 8. Interior:
 - a) Wall (Latex): UltraTech C163.
 - b) Wood (Stain): UltraTech C365.
 - c) Varnish:
 - 1) General: Semi-gloss Helmsman Spar Urethane manufactured by Minwax.
 - 2) Alternate Manufacturers: Comparable Varathane Premium Spar Urethane products manufactured by Rust-Oleum Brands, or accepted equal.
 - d. Paints:
 1. Exterior:
 - a) Housepaint, Flat: UltraTech C225.
 - b) Housepaint, Semi-Gloss: UltraTech C229.
 - c) Elastomeric Paint: 204S700 Elasto-Gard (Smooth).
 2. Interior:
 - a) Wallpaint, Flat: UltraTech C225.
 - b) Wallpaint, Semi-gloss: UltraTech C229.
 - e. Epoxy Coatings:
 1. Walls: Product No. 1W - 100% Solids Hi-Build Epoxy Coating manufactured by Epoxy Systems, Inc., or accepted equal.
 2. Epoxy Metal Coating: Refer to Section 09 96 56 - EPOXY COATINGS.

B. MIXING:

1. General: Mix paints at the factory; do not alter or reduce materials except as directed by manufacturer.
2. Colors: As selected by Architect from manufacturer's full range of submitted samples; factory mix match. No tinting of finish coats will be allowed at job site unless specifically approved by Architect.
3. Mildew Resistance: Add fungicidal agent to paint per manufacturer's recommendations; approximately 4 oz. per gallon. Add agent at the factory; clearly indicate on label that paint is mildew resistant.

3. EXECUTION:

A. PREPARATION:

1. Environmental Requirements:
 - a. General: Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the manufacturer.
 - b. Temperature:
 1. General: Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the manufacturer.
 2. Exterior Paints: 50 degrees F minimum during and for 48 hours after application; do not apply when temperature is over 85 degrees F, except in protected or shaded areas.
 3. Interior Paints: 65 degrees F for minimum of 48 hours before, during and for 48 hours after application.
 - c. Ventilation: Provide adequate ventilation of all interior spaces during application and curing of all painting products.
 - d. Lighting Level: Provide minimum 80 foot candles measured at mid-height of room.
2. Examination:
 - a. General: Examine conditions of surfaces in place before beginning work; report defects.
 - b. Shop Applied Primer: Test for compatibility with subsequent cover materials.
 - c. Moisture Content:
 1. General: Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following

2. Plaster and Gypsum Wallboard: 12 percent.
3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
4. Wood: 15 percent, measured in accordance with ASTM D2016.
5. Concrete Floors: 8 percent.
- d. Acceptance:
 1. General: Application of first coat of painting process constitutes acceptance of surface.
 2. Gypsum Board: Inspect after application of seal coat; application of subsequent coat of painting process constitutes acceptance of surface.
3. Storage:
 - a. General: Store in properly ventilated separate structure not less than 50'-0" from any other structure on the site.
 - b. Temperature: Maintain minimum of 45 degrees F and a maximum of 90 degrees F.
 - c. Fire Prevention: Take necessary precautions to prevent fire; remove paint-soiled rags and waste from building each day or store in metal containers with covers in the paint storage structure.
4. Protection: Protect adjacent surfaces not scheduled for paint finish from damage resulting from painting operations.
5. Surface Preparation:
 - a. General: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface conditions. Use Shellac to seal marks which may bleed through surface finishes.
 - b. Impervious Surfaces: Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow surface to dry.
 - c. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify that required acid-alkali balance has been achieved. Allow to dry.
 - d. Gypsum Board Surfaces: Fill minor defects with filler compound; spot prime defects after repair.
 - e. Galvanized Surfaces: Remove surface contamination and oils; wash with solvent. Apply coat of etching primer.
 - f. Concrete and Unit Masonry: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter at surfaces scheduled to receive paint finish. Remove oil and grease with a solution of trisodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
 - g. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
 - h. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand/power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
 - i. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Verify compatibility of specified primer and paint with shop applied primer.
 - j. Exterior Wood:
 1. Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied.
 2. Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied at surfaces to be painted only.
 - k. Interior Wood:
 1. Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
 2. Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
 - l. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.
6. Existing Fixtures: Remove or mask existing building detail accessories not to be painted such as building signage, outlet and switch plates, HVAC grilles, etc.; reinstall at completion of painting operations.

B. APPLICATION:

1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.

2. Performance:
 - a. General: Apply each coat to uniform finish, slightly darker than preceding coat unless otherwise approved. Sand wood and metal lightly between coats to achieve required finish. Vacuum clean surfaces free of loose particles; use tack cloth just prior to applying next coat. Allow applied coat to dry before next coat is applied.
 - b. Clear Finishes: Where required, tint fillers to match wood; work fillers into the grain before set and wipe excess from surface.
 - c. Woodwork: Prime concealed surfaces of woodwork; where scheduled to receive stain or varnish, finish with gloss varnish reduced 25 percent with mineral spirits.
 3. Finishing Mechanical and Electrical Equipment: Refer to Division 21 - FIRE SUPPRESSION; 22 - PLUMBING; 23 - HEATING, VENTILATING AND AIR CONDITIONING; 26 - ELECTRICAL for schedule of color coding and identification banding of equipment, duct work, piping, and conduit. Paint shop-primed equipment. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are pre-finished. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint. Paint dampers exposed behind louvers and grilles to match face panels. Paint exposed conduit and electrical equipment occurring in finished areas. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
 4. Exterior Surfaces:
 - a. Wood; Painted: One (1) coat primer sealer; two (2) coats enamel, semi-gloss.
 - b. Wood; Transparent: Two (2) coats stain; two (2) coats varnish, semi-gloss.
 - c. Concrete, Concrete Block: One (1) coat of block primer; two (2) coats, semi gloss.
 - d. Cement Plaster: One (1) coat primer sealer; two (2) coats elastomeric.
 - e. Steel: Refer to Section 09 96 56 - EPOXY COATINGS.
 5. Interior Surfaces:
 - a. Wood; Painted: One (1) coat prime sealer; two (2) coats enamel, semi-gloss.
 - b. Wood; Transparent: Two (2) coats stain; one (1) coat sealer; two (2) coats varnish, semi-gloss.
 - c. Concrete, Concrete Block: One (1) coat of block filler; two (2) coats semi-gloss; 2 Coats epoxy wall coating in wet areas.
 - d. Steel; Unprimed: One (1) coat primer; two (2) coats enamel, semi-gloss.
 - e. Steel; Primed: Touch-up with primer; two (2) coats enamel, semi-gloss.
 - f. Steel; Galvanized: One (1) coat primer (galvanized); two (2) coats of enamel, semi-gloss.
 - g. Gypsum Board: One (1) coat of primer sealer; two (2) coats wallpaint, flat; 2 coats semi-gloss where shown.
 - h. Insulated Coverings; Canvas and Cotton: One (1) coat primer sealer; two (2) coats enamel, semi-gloss.
- C. CLEANING:
1. General: Upon completion, remove masking materials, reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing, and thoroughly clean all exposed surfaces per manufacturer's instructions. Keep premises free from accumulation of waste and rubbish. At the completion of work remove surplus materials, rubbish, and debris.
 2. Touch-up: After detailed inspection of paint work, touch up or refinish abraded, stained or otherwise disfigured work, as required by the Architect.
 3. Cleaning: Remove containers, rags and debris from the site; observe special care in control or disposal of flammable materials.

EPOXY COATINGS

Section 09 96 56

1. GENERAL:

- A. SUMMARY: Provide Epoxy Coatings, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Steel Structures Painting Council (SSPC): Steel Structures Painting Manual.
- C. SUBMITTALS:
 - 1. General: Submit product data and a certificate stating compliance with federal, state and local VOC regulations.
 - 2. Samples: Submit manufacturer's standard colors.
 - 3. Closeout:
 - a. General: Submit maintenance data.
 - b. Guarantee:
 - 1. General: Provide in required form for a period of five (5) years from date of final acceptance by City.
 - 2. Criteria: Color and finish appearance shall remain unchanged throughout entire guarantee period.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.
 - 2. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by state and local jurisdictional regulations.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance:
 - 1. General: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 - 2. Paints and Coatings: Green Seal Standard GS-11.
 - 2. Epoxy Coating:
 - a. General: Specified products are manufactured by the Tnemec Co., Inc., or accepted equal.
 - b. Primer: Series 90-97 Tneme Zinc.
 - c. Body Coat: Series 73 Endura -Shield.
 - d. Topcoat: Series 1077 Enduralum.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements:
 - a. General: Comply with manufacturers requirements for temperature and humidity at time of application.
 - b. Ventilation: Provide adequate ventilation during application and curing.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Protection: Mask, remove or cover adjacent surfaces to protect against preparation and coating application procedures.
 - 4. Surface Preparation: Prepare per manufacturer and SSPC requirements.
- B. APPLICATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Performance: Apply each coat to smooth uniform finish.
- C. CLEANING:
 - 1. General: Upon completion, remove masking materials and fittings removed prior to finishing, and thoroughly clean all exposed surfaces per manufacturer's instructions.

* End Division 09 *

Division 10 - SPECIALTIES

VISUAL DISPLAY BOARDS

Section 10 11 10

1. GENERAL:

- A. SUMMARY: Provide Visual Display Boards, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): Designation System for Aluminum Finishes.
 - 2. American National Standards Institute (ANSI): ANSI A135.4 - Basic Hardboard.
 - 3. Composite Panel Association (CPA): CPA A135.4 - Basic Hardboard.
 - 4. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 5. Porcelain Enamel Institute (PEI): Performance Specifications for Porcelain Enamel Chalkboards.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Visual Display Boards:
 - a. General: Manufactured by the Platinum Visual Systems, a Division of ABC School Systems, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the Claridge Products and Equipment Co., Inc., or accepted equal.
 - c. Frames:
 - 1. General: Drop-in Tray System (DTS) System; size and configuration as shown.
 - 2. Sliding: Manufacturer's standard 2 panel Wall Hung Horizontal Sliding unit; size and configuration as shown.
 - 3. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - d. Marker Boards:
 - 1. Facing Sheet:
 - a) General: ASTM A424; 28 gage; enameling grade steel.
 - b) Writing Coat: Manufacturers standard, color selected by the Architect.
 - 2. Core Materials: Manufacturer's standard.
 - e. Accessories: Manufacturer's standard trough full length at writing boards.
 - 2. Linoleum Tackboards: Refer to Section 09 65 00 - RESILIENT FLOORING.
 - 3. Mounting Adhesive: Manufacturer's standard.
 - 4. Fasteners: Tamper-proof type screws; manufacturer's standard.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Frames: Install plumb, level, straight, and true to line in plane of wall. Fit to precise hairline joints with no rough edges. Do not install until painting is complete.
 - 3. Accessories: Install as shown and specified.

* * *

SIGNAGE

Section 10 14 00

1. GENERAL:

- A. SUMMARY: Provide Signage, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 - 3. California Building Code (CBC): Sections 1115B.5 and 1117B.5.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data, extra stock and guarantee.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Signage Requirements:
 - a. General: Conform to the requirements of California Title 24 Accessibility Requirements and the Americans with Disabilities Act.
 - b. Tactile Character Type: Tactile characters on signs shall be raised 1/32 inch minimum and shall be sans serif uppercase characters accompanied by Contracted Grade 2 Braille (see note below) CBC Section 1117B 5.5.1.
 - c. Tactile Character Size: Raised characters shall be a minimum of 5/8 inch and a maximum of 2 inches. CBC Section 1117B.5.5.2.
 - d. Finish and Contrast: Contrast between character, symbols and their background must be 70% minimum and have a non-glare finish. CBC Section 1117B.5.5.2.
 - e. Proportions: Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10. CBC Section 1117B.5.3. All letters measured must be uppercase. After choosing a type style to test, begin by printing the letter I, X, and O at 1 inch high. Place the template's 1:1 square over the X, or O, whichever is narrower. If the character is not wider than 1 inch, nor narrower than the 3:5 rectangle, the proportions are correct. Use the 1:5 rectangle to determine if the stroke of the I, is too broad, and the 1:10 rectangle to see if it is too narrow. If all the tests are passed, the type style is compliant with proportion requirement.
 - f. Braille: California (Contracted) Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Dots shall be 1/10 inch (2.54 mm) on center in each cell with 2/10 inch space between cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch above the background. Braille dots shall be domed or rounded. CBC Section 1117B 5 6
 - 3. Signs:
 - a. General:
 - 1. Material: Aluminum sheet per ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 - 2. Sign: 1/8 inch thick, unless otherwise noted, engraved laminated plastic, color as selected by Architect; engraving 1/32 inch deep in black background color.
 - 3. Letters: Uppercase 3/4 inch high, minimum; style as selected by Architect.
 - 4. Symbols: International style.
 - 5. Finish: Manufacturer's standard clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish.
 - b. Room Identification: Per CBC 1117B.5.9.
 - c. Toilet Room Door Signs:
 - 1. General: Per CBC Section 1115B.5; 1/4 inch thick with eased edges, with raised letters and braille, as shown. Background color to contrast with door color.
 - 2. Unisex Toilets: Superimposed 12 inch triangle on 12 inch circle, with word "Toilet" below.
 - 3. Side Mounted Signs: Per CBC Section 1115B.5 and 1117B.5.7.
 - d. Entrance and Exit Signs:
 - 1. General: Per CBC Section 1117B.5; 9 inches high x 6 inches wide, 1/4 inch thick, with eased edges.
 - 2. Entrance: International symbol of accessibility with the word "ENTRANCE" below

- symbol.
- 3. Exit: International symbol of accessibility with the word "EXIT" below symbol, and directional arrow pointing to required exit, where required.
- 4. Tactile Exit Signage: As shown.
- 4. Fasteners: As recommended by manufacturer; tamper-proof screws; anchors where required.
- 5. Adhesives: As recommended by manufacturer.

3. EXECUTION:

A. PREPARATION:

- 1. Environmental Requirements: Do not install signs when temperature is below 70 degrees F.
- 2. Examination: Examine conditions of work in place before beginning work; report defects.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Mounting location shall be determined so that a person may approach within 3 inches (76 mm) of signage without encountering protruding objects or standing within the swing of the door. CBC Section 1117 B 5 7.
- 2. Locations: As shown, or as directed by the Architect.
- 3. Surface Mounted:
 - a. Room Identification: As directed, per CBC 1117B.5.7.
 - b. Toilet Room Signs: As directed, per CBC Section 1115.B.5 and 1117B.5.7.
 - c. Entrance and Exit Signs:
 - 1. General: Per CBC Section 1117B.5.7.
 - 2. Entrance: Provide at each accessible entrance to the building.
 - 3. Exit: Provide at accessible exits where shown.
 - 4. Tactile Exit Signage: As shown.
- 4. Building Identification: Refer to Section 10 14 75 - BUILDING IDENTIFICATION.
- 5. Traffic Signage: Refer to Section 10 14 53 - TRAFFIC SIGNAGE
- 6. Exit Signs: As required; for illuminated exit signs refer to Division 26 - ELECTRICAL.

* * *

PLAQUES

Section 10 14 16

1. GENERAL:

- A. SUMMARY: Provide Plaques, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): Finishing Standards.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Copper Development Association (CDA): Properties of Wrought and Cast Copper Alloys.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Dedication Plaque:
 - a. General: Cast Bronze Plaque manufactured by Metallic Arts, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by A.R.K. Ramos Manufacturing Co., Inc.
 - c. Material: Manufacturer's standard.
 - d. Dedication Plaque:
 - 1. Size: As shown 16 inches x 24 inches.
 - 2. Border: Plain bevel; polished face.
 - 3. Background: Matte surface; oxidized with a clear lacquer finish.
 - 4. Letters: Helvetica medium; polished face.
 - 5. Layout: As shown.
 - e. City Seal:
 - 1. General: Border, background, letter style and layout as shown.
 - 2. Size: 36 inches in diameter.
 - f. Mountings: Tamperproof; as recommended by the manufacturer for condition shown.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Mounting: Concealed mounting per manufacturer's directions.

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SITE AND TRAFFIC SIGNAGE

Section 10 14 53

1. GENERAL:

- A. SUMMARY: Provide Site and Traffic Signage, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Americans with Disabilities Act (ADA): Standards.
 - 3. State of California, Department of Transportation (CalTrans): CalTRANS Standard Specifications.
 - 4. U.S. Department of Transportation, Federal Highway Administration (FHWA): Manual Uniform Traffic Control Devices for Streets and Highways.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Traffic Signage:
 - a. General: Signs manufactured by Safeway Sign Co.
 - b. Alternate Manufacturers: Comparable products manufactured by Western Highway Products, Inc., or accepted equal.
 - c. Plaque Signs: Provide manufacturer's standard silk-screened signs, baked-on enamel applied over reflectorized backing on .125 aluminum sheet.
 - d. Sign Text:
 - 1. Traffic and Regular Parking Control:
 - a) General: Parking Signs signs in compliance with requirements of State of California, Department of Transportation (CalTrans) Standard Specifications and regulations of jurisdictional agencies.
 - b) Stop Signs: Regulatory Signs as shown, comply with jurisdictional ordinances.
 - c) Reserved Parking:
 - 1) General: Identification as shown.
 - 2) Special Purpose: Motorcycle and electric vehicle recharging where shown.
 - 2. Accessible Parking Control:
 - a) General: Comply with (CBC), State of California, Department of Transportation (CalTrans) Standard Specifications and regulations of local authorities having jurisdiction.
 - b) Van Accessible Parking Sign: 12 inches wide x 18 inches high displaying the international symbol of accessibility; text below the symbol to read "RESERVED PARKING".
 - 3. Specialty Signs:
 - (a) General: Custom Signs as shown.
 - (b) Accessible Route: As shown; comply with ADA requirements.
 - (c) Recycling: As shown; comply with (CBC) requirements.
 - (d) No Smoking: As shown; comply with jurisdictional smoking ordinances.
 - e. Accessories: Provide welded galvanized steel fittings and galvanized or cadmium-plated steel bolts, nuts and washers.
 - f. Fasteners:
 - 1. General: Tufnut Security Nuts tamper-proof galvanized steel fasteners manufactured by The Tufnut Works; size as required.
 - 2. Alternate Manufacturers: Comparable products manufactured by Allegheny Bolt and Screw Corp., or accepted equal.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Site Traffic Signage: Locations as shown, or as directed by the Architect.

3. Building Identification: Refer to Section 10 14 75 - BUILDING IDENTIFICATION.

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BUILDING IDENTIFICATION

Section 10 14 75

1. GENERAL:

- A. SUMMARY: Provide Building Identification, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Aluminum Association (AA): Finishing Standards.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Copper Development Association (CDA): Properties of Wrought and Cast Copper Alloys.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Building Identification:
 - a. Dimensional Letters:
 - 1. General: Products are manufactured by Metallic Arts, Inc.
 - 2. Alternate Manufacturers: Comparable products manufactured by A.R.K. Ramos Manufacturing Co., Inc., or accepted equal.
 - 3. Appearance: Polished face and matte finished sides.
 - 4. Aluminum:
 - a) Castings:
 - 1) General: Manufacturer's standard cast aluminum.
 - 2) Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - b) Extrusions: ASTM B221; minimum 6063-T5.
 - c) Style: Neutra.
 - d) Size:
 - 1) Type 1: 8 inches high, 1-1/8 inch stroke and 1/2 inch depth.
 - 2) Type 2: 9 inches high, 1-1/4 inch stroke and 1/2 inch depth.
 - 3) Type 3: 12 inches high, 1-5/8 inch stroke and 1/2 inch depth.
 - 4) Finish: Clear anodized AA-M31A31 on face, AA-M35A31 on sides.
 - 5. Copper Alloys:
 - a) Bronze Sand Castings: ASTM B584, alloy UNS No. C83600 (No. 1 manganese bronze).
 - b) Style: Helvetica Regular.
 - c) Size: 9-1/2 inches high, 1-1/4 inch stroke and 1/2 inch depth.
 - d) Finish: Clear lacquer.
 - b. Fastenings and Spacers: Corrosion resistant, as recommended by manufacturer; silhouette spacers to match letter material.
 - c. Fasteners: As recommended by the manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Location: As shown.
 - 3. Titles Required: As shown.
 - 4. Building Identification:
 - a. Dimensional Letters: Spacing as recommended by manufacturer.
 - b. Mounting: Drill holes for fasteners in mounting surface not more than 1/16 inch larger than fastener; place with quick-setting collars or sleeves over fasteners. Three (3) fasteners per letter; two (2) fasteners for letter "I"; secure from back; fasteners not visible from face. Set in bed of sealant.
 - 5. Address Signs:
 - a. General: Install as shown.

b. Electrical: Refer to Division 26 - ELECTRICAL.

* * *

TELEPHONE SPECIALTIES

Section 10 17 00

1. GENERAL:

- A. SUMMARY: Provide Telephone Specialties, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Emergency Telephone:
 - a. General: 1600 A Series ADA Compliant Emergency Phones manufactured by Viking Electronics, or approved equal.
 - 2. Telephone Instrument: Per telephone service company requirements.
 - 3. Fasteners: Tamperproof; as recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION: Examine conditions of work in place before beginning work; report defects.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Indoor Enclosures: As shown.
 - 3. Outdoor Enclosures: As shown.
 - 4. Telephone Instrument: Instrument, wiring and connection to service per telephone company requirements

* * *

WALL PROTECTION

Section 10 26 00

1. GENERAL:

- A. SUMMARY: Provide Wall Protection, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American National Standards Institute (ANSI): ANSIA117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Wall and Corner Guards:
 - a. General: Specified products are manufactured by Alpar Architectural Products, LLC.
 - b. Alternate Manufacturers: No known equal.
 - c. Corner Guard: Model No. SSCG; height, wing size and angle as shown.
 - 2. Fasteners: Manufacturer's standard, and as shown.
 - 3. Adhesive: Manufacturer's standard.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Coordinate the work with wall or partition sections for installation of concealed blocking or anchor devices.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Corner Guards: Install components per manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members. Terminate rails 6 inches short of door openings and intersecting walls.

* * *

SOLID SURFACE SHOWER BASE

Section 10 21 18

1. GENERAL:

- A. SUMMARY: Provide Solid Surface Shower Base, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. Americans with Disabilities Act (ADA): Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - 2. American National Standards Institute (ANSI): ANSI Z 124.1.2 – Plastic Bathtub & Shower Units.
 - 3. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 4. National Sanitation Foundation (NSF): Standards.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings, samples.
 - 2. Closeout: Submit maintenance data, and guarantee in required form for a period of three (3) years from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS- 36.
 - 2. Solid Surface Shower Base:
 - a. General: Manufactured by the Avonite Surfaces Division of Aristech Acrylics, LLC.Swan Corp.
 - b. Alternate Manufacturers: Comparable products manufactured by Royal Stone Industries, Inc., or accepted equal.
 - c. ADA Compliant: Shower Base: Manufacturers standard 36 inch x 62 inch Roll-in Pan with Collapsible Dam.
 - 1. Shower Enclosure: As shown.
 - d. Color: As selected by Architect.
 - 3. Fasteners: As recommended by manufacturer.
 - 4. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Shower Base: Install components plumb and level, as shown.
 - 3. Accessories and Shower Doors: Refer to Section 10 28 13 - TOILET ACCESSORIES.
 - 4. Plumbing Connection and Fittings: Refer to Division 22 - PLUMBING.

* * *

COLUMN GUARDS

Section 10 26 15

1. GENERAL:

- A. SUMMARY: Provide Column Guards, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Column Guards:
 - a. General: Concrete Wrap Model No. CW0244-48 manufactured by Sentry Protection Products.
 - b. Alternate Manufacturers: No known equal.
 - c. Blanket: Manufacturers standard semi-flexible, crack resistant plastic.
 - d. Straps: Manufacturers standard.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Column Guards: Trim blankets to fit column shown; strap in place with buckles concealed from view.
- C. FIELD QUALITY CONTROL:
 - 1. General:
 - 2. Field Testing:
 - 3. Retesting: Make necessary corrections to non-conforming work; retest at Contractor's expense.

* * *

TOILET ACCESSORIES

Section 10 28 13

1. GENERAL:

- A. SUMMARY: Provide Toilet Room Accessories, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American National Standards Institute (ANSI):
 - a. ANSI 117.1: Safety Standards for the Handicapped.
 - b. ANSI Z97.1: Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
 - 3. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 - c. ADA Accessibility Guidelines for Buildings and Facilities (ADAAG):
 - 1. General: Appendix A to Part 1191.
 - 2. Checklist: ADAAG Checklist for Buildings and Facilities.
 - 4. International Sanitary Supply (ISSA): Standards.
 - 5. California Building Code (CBC): Section 1115B.8.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Closeout:
 - a. General: Submit maintenance data.
 - b. Guarantee:
 - 1. General: Submit in required form for a period of one (1) year from date of final acceptance by City.
 - 2. Welded Stainless Steel Framed Mirrors: Fifteen-year (15) year guarantee against silver spillage.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Manufacture:
 - a. General: Classic or Contura Series as shown, manufactured by Bobrick Washroom Equipment, Inc., unless otherwise indicated; key lockable accessories alike.
 - b. Alternate Manufacturers: Comparable products manufactured by American Specialties, Inc., or accepted equal.
 - c. Finishes: Type 304 stainless steel; No. 4 satin finish, unless otherwise specified.
 - d. Templates and Backplates: Furnish to applicable trades as required for each accessory together with location and mounting height.
 - 2. Toilet Accessories:
 - a. Multi-purpose Unit: Paper Towel Dispenser/Waste Receptacle, Model No. B-3474, recessed.
 - b. Mirrors:
 - 1. General: Mirror glass per ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality q1 mirror select, 1/4 inch thick; sizes as shown.
 - 2. Safety Backing: Clear vinyl backing conforming to ANSI Z97.1-1975 and CPSC 16 CFR 1201 Category II; manufactured by Buckmin Industries, or accepted equal.
 - 3. Framed Mirrors:
 - a) General: Stainless steel, with countersunk "theftproof" screws.
 - b) Frame: Model No. B-290; size as shown.
 - c) Backs: Resilient filler and galvanized steel or hardboard backing plate, without filler; attach with "theftproof" concealed hangers. Corrugated cardboard or other moisture absorbent filler not acceptable.
 - c. Paper Towel Dispensers: Model No. B-263 for singlefold towels.
 - d. Soap Dispensers: Wall mounted Georgia Pacific, Model No. 53053 Manual Soap and Sanitizer Dispenser; liquid soap.
 - e. Grab Bars: Series No. B-5806; 18 gage 1-1/4 inch o.d. stainless steel tubing; size as shown.
 - f. Toilet Tissue Dispensers: Surface mounted; Model No. B-6867, 2 roll capacity.
 - g. Toilet Seat Cover Dispensers: Surface mounted; Model No. B-4221.
 - h. Sanitary Napkin Disposal: Model No. B-4353; recessed.
 - i. Shower Curtain Rod: Model No. B-6047; 1-1/4 inch diameter, length as required.
 - j. Folding Shower Seat: Model No. B-5181.
 - k. Towel Bar: Model No. B-530, extra heavy duty; 18 or 24 inch, as shown.
 - l. Towel Pin: Model No. B-6777.
 - m. Rope Hooks: Single; Model No. B-6717.

- n. Mop and Broom Holder: Model No. B-239; 34 inch.
- 3. Corner Guard:
 - a. General: Acrovyn CO Series manufactured by Construction Specialties, Inc.; condition and height as shown; furnish for adhesive mounting.
 - b. Alternate Manufacturers: Comparable products manufactured by Bobrick Washroom Equipment, Inc., or accepted equal.
- 4. Shower Doors:
 - a. General: Model No. 950 Sterling Standard Pivot Shower Door with clear anodized aluminum finish and obscure glass as manufactured by the Kohler Co.; size as shown.
 - b. Alternate Manufacturers: Comparable products manufactured by American Shower Door Co., or accepted equal.
- 5. Fasteners: As recommended by manufacturer; non-corrosive, tamperproof type.

3. EXECUTION:

A. PREPARATION:

- 1. Examination: Examine conditions of work in place before beginning work; report defects.
- 2. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Conceal evidence of drilling, cutting, and fitting to room finish under accessory.
- 2. Toilet Room Accessories: Install at locations and heights shown, with concealed vandal-proof fasteners where mountings are made without back plates and where accessories are recessed or fastener is exposed to view. Where possible, mount accessories back-to-back. Attach accessories securely to walls or toilet partitions as recommended by manufacturer for each item and each condition; adhesive installation not permitted.
- 3. Grab Bars:
 - a. General: Anchor grab bars to withstand minimum downward pull of 500 lbs. Secure grab bars to preset mounting plates screwed to studs or backing plate, using brass or stainless steel vandal proof fastenings. Where mounted on toilet partitions, provide back-to-back sleeves per manufacturer's recommendations.
 - b. At Toilets: Install per CBC 1115.7.1.3.; accessories shall not be located closer than 1-1/2 inch clear from the tangent point of the grab bar.
 - c. At Shower in Room 323: Cut grab bar to fit; reweld and grind smooth.
- 4. Shower Doors: Hang level, straight and plumb; completely watertight.

* * *

FIRE EXTINGUISHERS AND CABINETS

Section 10 44 13

1. GENERAL:

- A. SUMMARY: Provide Fire Extinguishers and Cabinets, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American National Standards Institute (ANSI):
 - a. ANSI/NFPA 10: Portable Fire Extinguishers.
 - b. ANSI/UL 711: Rating and Fire Testing of Fire Extinguishers.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Intertek Testing Services (ITS): Approval for type, rating and classification of extinguisher.
 - 4. National Fire Protection Association (NFPA): Fire Extinguisher Standards.
 - 5. Underwriters Laboratories, Inc. (UL): Listing for type, rating and classification of extinguisher.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Certificates: Submit manufacturer's certificate stating that materials meet or exceed specified requirements.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Manufacture:
 - a. General: Manufactured by the Potter-Roemer.
 - b. Alternate Manufacturers: Comparable products manufactured by J.L. Industries Division of the Activar Construction Products Group, or accepted equal.
 - 2. Cabinets:
 - a. General: 1700 Series.
 - b. Mounting: Flush mounted typical; surface mounted where shown.
 - c. Material and Finish: White tub with red door and trim.
 - d. Size: Manufacturer's standard.
 - e. Glazing: Clear glass; color as selected by the Architect.
 - f. Lettering: Manufacturer's standard, vertical; color as selected by the Architect.
 - 3. Extinguishers:
 - a. General: Fire fighting devices must be approved by Underwriters Laboratories, Inc., bear UL label, and approved by Fire Marshal.
 - b. Cabinet Type: Multi-purpose Dry Chemical; Model No. 3005 (2A-10B:C).
 - c. Wall Mounted:
 - 1. General: Model No. 3005 (2A-10B:C) Multi-purpose Dry Chemical 3202 (2A).
 - 2. Wall Bracket: Manufacturer's standard.
 - 4. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements: Do not install when temperatures may cause freezing of extinguisher ingredients.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Cabinets: Where shown; anchor components firmly in place.
 - 3. Wall Brackets: Install as required by codes and regulations or as shown; anchor components firmly in place.
 - 4. Extinguishers:
 - a. Cabinet: One (1) extinguisher for each cabinet.
 - b. Wall Brackets: One (1) extinguisher (portable) for each wall bracket.
- C. SERVICE: Inspect, charge and tag fire extinguishers not more than ten (10) days prior to occupancy of building by City.

* * *

METAL TURN-OUT LOCKERS

Section 10 51 63

1. GENERAL:

- A. SUMMARY: Provide Metal Turn-out Lockers, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Metal Turn-out Lockers:
 - a. General: Custom fabricated from Model NO. 5578HDDP manufactured by Lyon Workspace Products, LLC.
 - b. Alternate Manufacturers: No known equal.
 - c. Size: 24 inches x 24 inches 72 inches.
 - d. Construction:
 - 1. General: Cold rolled steel with flat top, no base legs, 45% ventilation and all welded construction.
 - 2. Opening:
 - a) General: Manufacturer's standard door and frame.
 - b) Hardware: Recessed stainless steel with padlock attachment and piano hinges.
 - 3. Interior Equipment:
 - a) General: Provide shelf and coat rod at top as shown.
 - b) Hooks: Three (3) manufacturer's standard paired hooks.
 - e. Finish: Manufacturer's standard heavy duty powder coating; color selected by the Architect.
 - f. Name Plates: Provide an interchangeable name tag holder on each locker.
 - 2. Fasteners:
 - a. General: Cadmium plated steel.
 - b. Washers: Provide lock washers for nuts on moving parts; prevent loosening of nuts.
 - c. Anchors: As shown.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Placement: Install lockers plumb, level, secure, rigid and flush.
 - 3. Anchorage: Install with concealed bolts, to solid anchorage. Secure lockers to walls and base as shown; bolt locker units together.
 - 4. Trim: Provide hairline joints flush against adjacent materials or locker components.
 - 5. Ventilation: Provide perforations in sides, tops, doors and shelves to permit 45% ventilation through locker.

* * *

FLAGPOLE

Section 10 75 00

1. GENERAL:

- A. SUMMARY: Provide Flagpole, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. National Electrical Manufacturers Association (NEMA): NEMA MG1 - Motors and Generators (grounding).
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Design criteria for flagpole is to be resistant without permanent deformation, 80 mph wind velocity, non-resonant, safety design factor of 2.5, flagged with 5'-0" x 8'-0" flag.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Flagpole:
 - a. General: Model No. C45080188 "Continental" aluminum flagpole manufactured by Concord Industries, Inc.; roof mounted.
 - b. Alternate Manufacturers: Comparable products manufactured by Olympus Flag and Banner, or accepted equal.
 - c. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - d. Size:
 - 1. General: 8 inch diameter shaft, 0.188 inch wall thickness.
 - 2. Height: 45'-0".
 - e. Accessories:
 - 1. General: Ball, truck, halyard, cleat, flashing collar and roof mounting hardware; manufacturer's standard.
 - 2. Finial Ball: Aluminum; 6 inch diameter.
 - f. Fasteners: Aluminum or stainless steel; as recommended by manufacturer.
 - g. Finish:
 - 1. General: Satin brush finish on exposed aluminum, 80 grit or finer; color as selected by the Architect; finish with paste wax.
 - 2. Finial Ball: Gold anodized.
 - h. Roof Mounting Hardware: Manufacturer's standard.
 - i. Grounding Cable: Copper; No. 6 AWG, soft drawn.
 - 2. Asphaltic Paint: FS TT-C-494, Type 2.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 3. Delivery: Spiral wrap flagpole with protective covering and pack in protective shipping container before transporting to site.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Roof Mounting Hardware: As shown, per manufacturers recommendations.
 - 3. Dissimilar Metals: Coat contacting dissimilar metals with 7-1/2 mil thickness, minimum, of asphaltic paint, each surface.
 - 4. Pole:
 - a. General: Set pole plumb and electrically ground per manufacturer's instructions.
 - b. Fittings: Install as directed.
 - c. Tolerances: Maximum variation from plumb of 1 inch in 25'-0".

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BIRD CONTROL DEVICES**Section 10 81 13**

1. GENERAL:

- A. SUMMARY: Provide Bird Control Devices, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Bird Control:
 - a. General: Model No. S manufactured by Nixalite of America.
 - b. Alternate Manufacturers: Comparable products manufactured by Fly Bye Bird Control Products, or accepted equal.
 - c. Quantity: Provide 250 linear feet.
 - 2. Adhesive: As recommended by manufacturer; compatible with application surface.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified. Place in locations as directed by City's representative.

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MISCELLANEOUS SPECIALTIES

Section 10 95 00

1. GENERAL:

- A. SUMMARY: Provide Miscellaneous Specialties, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Miscellaneous Specialties:
 - a. T.V. Mounting System:
 - 1. General: Manufactured by the Lucasey Manufacturing Corp.
 - 2. Alternate Manufacturers: Comparable products manufactured by Peerless Industries, Inc., or accepted equal.
 - 3. Flat Screen Wall Mounting Bracket:
 - a) General: Verify following with the City's Representative before installation.
 - (b) Type 1: Small Wall Mount Model No. LC200DS2; triple articulating.
 - c) Type 2: Large Wall Mount Model No. FSWADS2; articulating with tilt.
 - b. Lock Box:
 - 1. General: 3200 Series, recessed, with hinged door, as manufactured by the Knox Co., color selected by the Architect.
 - 2. Alternate Manufacturers: No known equal.
 - c. Stainless Steel Wall Shelves:
 - 1. General: Manufactured by the BK Resources.
 - 2. Alternate Manufacturers: No known equal.
 - 3. Type 1: Model No. BKWS-1624.
 - 4. Type 2: Model No. BKWS-1636.
 - d. Mailbox:
 - 1. General: Model No. 4145P-WHT manufactured by Salsbury Industries; provide mounting hardware as required.
 - 2. Alternate Manufacturers: Comparable products manufactured by Cutler Manufacturing Division of the Florence Corp., or accepted equal.
 - e. Round Convex Safety Mirrors:
 - 1. General: Model No. RP-260MR convex acrylic plastic mirror, scratch resistant, 26 inches diameter as manufactured by Reflection Products, Inc., complete with all mounting brackets and accessories.
 - 2. Alternate Manufacturers: Comparable products manufactured by Security Mirrors, or accepted equal.
- 2. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Flat Screen Mounting System: Anchor as shown.
 - 3. Stainless Steel Wall Shelves: Anchor as shown.
 - 4. Mailbox: Install as shown.
 - 5. Circular Convex Parking Mirror: Install as directed by the City's Representative.

* End Division 10 *

Division 11 - EQUIPMENT

SCBA COMPRESSOR

Section 11 11 16

1. GENERAL:

- A. SUMMARY: Provide SCBA Compressor, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American Society of Mechanical Engineers (ASME): Standards for compressed air cylinders.
 - 3. National Electrical Manufacturers Association (NEMA): NEMA 250 - Enclosures for Electrical Equipment.
 - 4. National Fire Protection Association (NFPA): NFPA 1901 - Standard for Automotive Fire Apparatus.
 - 5. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of five (5) year[s] from date of final acceptance by City.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience manufacturer approved.

2. PRODUCTS:

- A. EQUIPMENT:
 - 1. SCBA Compressor:
 - a. General: Unicus III, Model No. UN III/25H-E3 manufactured by Bauer Compressors, Inc.
 - b. Alternate Manufacturers: No equals will be accepted.
 - c. Accessories: Manufacturer's standard CO Monitor, 75'-0" high pressure reel mounted on the outside of cabinet, additional air storage cylinders and panel mounted remote fill hose connection.
 - 2. Anchors: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Electrical Connection: Refer to Division 26 - ELECTRICAL.

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RESIDENTIAL APPLIANCES

Section 11 31 00

1. GENERAL:

- A. SUMMARY: Provide Residential Appliances, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Americans with Disabilities Act (ADA): Access to Buildings requirements.
 - 3. Association of Home Appliance Manufacturers (AHAM): Standards.
 - 4. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory, Building Material Directory and standards for electrical equipment.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Samples: Submit manufacturer's standard colors.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. EQUIPMENT:
 - 1. Gas Cooking Appliance:
 - a. Range:
 - 1. General: BlueStar 60 Inch RNB Heritage Classic manufactured by Blue Star/Prizer-Painter Stove Works, Inc.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - b. BBQ Grill:
 - 1. General: Summit S-470 Grill, with rotisserie, as manufactured by Weber-Stephen Products LLC.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - 2. Electric Cooking Appliances:
 - a. Convection/Microwave Oven:
 - 1. General: Model No. PEB1590SMSS manufactured by the General Electric Co.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - b. Exhaust Hood for Range: Refer to Section 23 34 16 - CENTRIFUGAL HVAC FANS.
 - c. Automatic Coffee Brewer:
 - 1. General: Model No. 07400.0005, VLPF, low profile with two (2) warmer's, as manufactured by Bunn Coffee Makers.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - 3. Decanter: Model No. 06100.0101 Easy Pour black decanter.
 - d. Beverage Merchandiser:
 - 1. General: Model No. SCR1500 manufactured by Summit Appliances Division, Felix Storch, Inc.
 - 2. Alternate Manufacturers: No equals will be accepted.
 - 3. Refrigerator:
 - a. General: Model No. PDCS1NCZLSS manufactured by the General Electric Co., 120v, with Model No. WX08X10006 SmartConnect tubing kit; stainless steel.
 - b. Alternate Manufacturers: No equals will be accepted.
 - 4. Freezer:
 - a. General: Model No. PFCS1RKZSS manufactured by the General Electric Co., 120v, with Model No. WX08X10006 SmartConnect tubing kit; stainless steel.
 - b. Alternate Manufacturers: No equals will be accepted.
 - 5. Ice Maker:
 - a. General: Model No. CU1526 manufactured by Scotsman Ice Systems.
 - b. Alternate Manufacturers: No equals will be accepted.
 - 6. Food Waste Disposer: Refer to Section 22 41 00 - RESIDENTIAL PLUMBING FIXTURES.
 - 7. Dishwasher:
 - a. General: Model No. SHX55R55UC manufactured by Bosch Home Appliances, 120v, stainless steel.
 - b. Alternate Manufacturers: No equals will be accepted.
 - 8. Washer/Dryer:
 - a. General: Commercial Homestyle topload washer and matching dryer manufactured by the Speedqueen Division of Alliance Laundry Systems LLC.
 - b. Alternate Manufacturers: No equals will be accepted.

- c. Extractor:
 - 1. General: Model No. SX75PVX (75 lb, soft mount) manufactured by Speedqueen Division of Alliance Laundry Systems LLC.
 - 2. Alternate Manufacturers: No equals will be accepted.
- 9. Drying Cabinet:
 - a. General: UniMac Model No. UTGCEDG44 manufactured by Alliance Laundry Systems.
 - b. Alternate Manufacturers: No equals will be accepted.
- 10. Finish: Colors selected by the Architect.

3. EXECUTION:

A. PREPARATION:

- 1. Examination: Examine conditions of work in place before beginning work; report defects.
- 2. Measurements: Take field measurements; report variance between plan and field dimensions.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Kitchen Equipment: Install as shown; coordinate service connection with Division 22 - PLUMBING, Division 23 - HEATING, VENTILATING AND AIR CONDITIONING and Division 26 - ELECTRICAL.

* * *

PLAY STRUCTURES

Section 11 68 13

1. GENERAL:

- A. SUMMARY: Provide Play Structures, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Play Structures:
 - a. General: Indoor Spiral Slide (Firestation Application) manufactured by American Playground Corp.
 - b. Alternate Manufacturers: Comparable products manufactured by Natural Structures, or accepted equal.
 - c. Size: As shown.
 - d. Enclosures: Refer to Section 05 50 00 - METAL FABRICATIONS.
 - e. Colors: Selected by the Architect.
 - f. Anchors and Fasteners: As recommended by the Manufacturer.
 - 2. Safety Matting: As recommended by manufacturer.
 - 3. Adhesives: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Erection:
 - a. General: Install as shown with components plumb, level and true to line, securely anchored in place.
 - b. Equipment and Components: Firmly secure members and anchor as required: eliminate rough or protruding edges.
 - 3. Safety Matting: Install as shown.

* End Division 11 *

Division 12 - FURNISHINGS

WINDOW BLINDS

Section 12 21 00

1. GENERAL:

- A. SUMMARY: Provide Window Blinds, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Horizontal Blinds:
 - a. General: Riviera 1 standard blinds manufactured by Levolor Contract, a Newell Rubbermaid Co.; provide configurations to fit regular or irregular windows as shown; color as selected by Architect.
 - b. Alternate Manufacturers: Comparable products manufactured by Hunter-Douglas, Inc., or accepted equal.
 - 2. Roller Shades:
 - a. General: Mecho 5/ Standard with Fascia with extended brackets, manufactured by MechoShade Systems, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by Lutron Shading Systems by VIMCO, or accepted equal.
 - c. Bottom-up Shade: Manufacturers standard.
 - d. Motorized Shades: Electro 3 Standard; provide Double Shade where shown
 - e. Shade Cloth: EcoVeil Open Linear Weave visually transparent single-fabric shade cloth; color selected by the Architect.
 - 3. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Horizontal Blinds: Install blinds, anchorages, fastenings and accessories as shown, level and in alignment with window opening. Provide brackets and intermediate supports to permit easy entrance and removal of head rail.
 - 3. Roller Blinds:
 - a. General: Install with uniform space 2/3 width of window frame a sides of window and flush fit to sill.
 - b. Bottom-up Shade: Install as shown.
 - c. Motorized Shade: Install single and double shade where shown; coordinate service connection with Division 26 - ELECTRICAL.
- C. ADJUSTMENT: Prior to acceptance, adjust moveable parts to assure smooth operation.

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INTERIOR CLOCKS**Section 12 46 19**

1. GENERAL:

- A. SUMMARY: Provide Interior Clock, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Interior Clock:
 - a. General: Gallery Wall Clock Model No. 625-166 manufactured by Howard Miller; 16 inch diameter, battery operated.
 - b. Alternate Manufacturers: No known equal.
 - 2. Fasteners: As recommended by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Interior Clock: Install as shown

* * *

FLOOR MATS AND FRAMES

Section 12 48 13

1. GENERAL:

- A. GENERAL: Provide Floor Mats and Frames, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout:
 - a. General: Submit maintenance data and guarantee in required form for a period of five (1) year from date of final acceptance by City.
 - b. Extra Stock: Deliver one (1) percent or a minimum of one full container of each kind and type of tread insert installed.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Recessed Floor Mats:
 - a. General: envIRONtread II, Model No. M-600RS manufactured by Arden Architectural Division of Babcock Davis.
 - b. Alternate Manufacturers: Comparable products manufactured by Construction Specialties Inc., or accepted equal.
 - c. Recycled Aluminum Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes at least 10% (based on cost) of the total value of the materials for the project.
 - d. Frame: Model No. F-6 recessed frame; mill finish
 - e. Rail:
 - 1. General: Manufacturers standard aluminum; mil finish.
 - 2. Insert: Color selected by Architect.
 - 2. Fasteners: Manufacturer's standard; use adjustable extruded masonry anchors at frames.

3. EXECUTION:

- A. PREPARATION:
 - 1. Scheduling: Coordinate embedment of accessories in concrete.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 4. Surface Preparation: Coordinate and verify that slab is finished with leveling screed to meet manufacturers performance requirements.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Recessed Floor Mats:
 - a. General: Install per manufacturer's instructions, as shown.
 - b. Floor Mat:
 - 1. Set mat at height recommended by manufacturer for most effective cleaning action.
 - 2. Door Swings: Coordinate top of mat surface with bottom of doors that swing across to provide ample clearance between door and mat.
 - 3. Electrolytic Protection: Use protective coating to isolate aluminum surfaces in contact with masonry.

* * *

BICYCLE RACKS

Section 12 93 13

1. GENERAL:

- A. SUMMARY: Provide Bicycle Racks, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings and samples.
 - 2. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Bicycle Racks:
 - a. Type 1:
 - 1. General: Model No. UX238-SF-P manufactured by Belson Outdoors, Inc.; galvanized steel finish.
 - 2. Alternate Manufacturers: No known equal.
 - b. Type 2:
 - 1. Bola Bike Rack manufactured by Landscape Forms, Inc.
 - 2. Alternate Manufacturers: No known equal.
 - 2. Fasteners:
 - a. General: Cadmium plated steel; tamperproof at exposed bolt heads.
 - b. Washers: Provide lock washers for nuts on moving parts; prevent loosening of nuts.
 - c. Anchors: As shown.

3. EXECUTION:

- A. PREPARATION:
 - 1. Examination: Examine conditions of work in place before beginning work; report defects.
 - 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Placement: Install plumb, secure and rigid.
 - 3. Anchorage: As shown.

* End Division 13 *

Division 13 - SPECIAL CONSTRUCTION

NOT USED

* End Division 13 *

Division 14 - CONVEYING EQUIPMENT

HOLELESS HYDRAULIC ELEVATOR

Section 14 24 23

1. GENERAL:

A. SUMMARY: Provide Holeless Hydraulic Elevator, as shown and specified per Contract Documents.

B. REFERENCES:

1. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design:
 1. General: U.S. Department of Justice, 28 CFR Part 36 - 2010.
 2. Accessibility Guidelines for Buildings and Facilities (ADAAG): ADA Accessibility Guidelines.
2. International Code Council (ICC): ICC A117.1 - Accessible and Usable Buildings and Facilities.
3. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
4. American Society of Mechanical Engineers (ASME): ASME A17.1 - Handbook on Safety Code for Elevators and Escalators.
5. California Building Code (CBC): Title 24, Part 2; Chapter 11B (11B-103, 202, 206, 216, 407, 408, 409 & 703), Chapter 10 - Means of Egress, and Chapter 30 - Elevators and Conveying Systems.
6. State of California, Department of Industrial Relations (Cal/OSHA): California Code of Regulations (CCR): Title 8 - Elevator Safety Orders.
7. Underwriters Laboratories, Inc. (UL):
 - a. General: Fire Resistance Directory and Building Material Directory.
 - b. UL-10B: Fire Tests of Door Assemblies.

C. SUBMITTALS:

1. General: Submit product data, shop drawings and samples.
2. Certificates: Submit inspection certificates of governing authorities.
3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by City.

D. QUALITY ASSURANCE:

1. Design Criteria:
 - a. Contract Speed: Within 5% under any loading condition, in up direction; contract speed or faster, in down direction.
 - b. Leveling: Within 1/4 inch under any loading condition, in direction of car travel, without overshooting.
 - c. Working Pressure: Maximum 400 psi for hydraulic equipment.
2. Qualifications: Installer specializing in the work of this Section with minimum five (5) years documented experience; manufacturer approved.

2. PRODUCTS:

A. MATERIALS:

1. Holeless Hydraulic Passenger Elevator:
 - a. General: EcoSpace Low-Rise Elevator as manufactured by Kone, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by the Otis Elevator Division of United Technologies, or accepted equal.
 - c. Building Code Requirements: Refer to California Building Code (CBC): Title 24, Part 2; Chapter 11B (11B-103, 202, 206, 216, 407, 408, 409 & 703) and Chapter 30 - Elevators and Conveying Systems.
 - d. Rated Capacity: 3,500 pounds.
 - e. Car Speed: 150 feet per minute.
 - f. Stops: Four (4) stops with openings at front of hoistway; 60'-0" rise, maximum.
 - g. Platform: Size as shown.
 - h. Entrance Type and Width: Front opening; 3'-6" x 7'-0".
2. Hoistway Equipment:
 - a. General: Manufacturer's standard hoistway operating devices, guide rails, hoistway fascia, carframe and safety.
 - b. Platform: Manufacturer's standard steel, with aluminum threshold.
3. Power:
 - a. Machine Unit: Hydraulic.
 - b. Electrical:
 1. General: 208 Volts, 3 Phase, 60 Hertz.
 2. Lighting Supply: 120 Volts, 1 Phase, 60 Hertz.

4. Hoistway Entrances:
 - a. General: Manufacturer's standard fire rated No. 4 stainless steel frames and doors.
 - b. Sills: Extruded aluminum with non-slip wearing surfaces.
5. Car Enclosure:
 - a. General: Manufacturer's standard cab, with 8'-0" canopy.
 - b. Car Entrance: Door and frame to match hoistway entrance.
 - c. Floor and Base:
 1. Floor: As scheduled.
 2. Base: Black powder coated.
 - d. Walls:
 1. General: Manufacturer's standard No. 4 stainless steel.
 2. Car Front: Finish to match entrance.
 3. Handrail: Sides and rear; 1/2 inch x 2 inch; No. 4 stainless steel.
 4. Pad Hangers: Manufacturer's standard.
 - e. Ceiling:
 1. General: No. 4 stainless steel with 9 equally spaced disc lights with brushed stainless steel frames.
 2. Ceiling Height: 8'-0".
6. Operation and Control:
 - a. General: Simplex Collective Operation with microprocessor control.
 - b. Signals:
 1. General: Vandal resistant fixtures, with satin stainless steel finish.
 2. Car Operating Panel: Locate at front of car with raised handicapped markings; illuminated landing destination buttons and car position indicator, with vocal landing passing and arrival announcement. Provide manufacturer's standard certificate frame.
 3. Hall Fixtures: Manufacturer's standard up and down call fixture, directional lantern, and car arrival chime bell.
 - c. Doors: Automatic; direct current powered with proximity-type door reversal device.
 - d. Emergency Operation:
 1. General: Manufacturer's standard automatic emergency lowering.
 2. Firefighters Service: Per ASME A 17.1, including alternate floor return.
 3. Lighting: Manufacturer's standard, with battery pack.
7. Accessories:
 - a. Telephone Cabinet: Manufacturer's standard, ADA compliant self dialing type.
 - b. Wall Pads: Fire retardant, quilted canvas duck.

3. EXECUTION:

- A. PREPARATION:
 1. Examination: Examine conditions of work in place before beginning work; report defects.
 2. Measurements: Take field measurements; report variance between plan and field dimensions.
- B. INSTALLATION:
 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Hoistway Equipment:
 - a. General: Per manufacturer's directions; anchor rails to structure; guide rail supports specified under Section 05 12 00 - STRUCTURAL STEEL FRAMING.
 - b. Elevator Pit Ladder: Refer to Section 05 50 00 - METAL FABRICATIONS.
 3. Power: Per Division 26 - ELECTRICAL.
 4. Hoistway Entrances: Angle thresholds as specified under Section 05 50 00 - METAL FABRICATIONS.
 5. Car Enclosure:
 - a. General: Per manufacturer's directions.
 - b. Floor and Base:
 1. General: As scheduled; installed under Section 09 65 00 - RESILIENT FLOORING, as shown.
 2. Carpeting: Refer to Section 09 68 02 - CARPETING.
 6. Operation and Control: Rise between stops as shown. Ventilation per Division 23 - HEATING, VENTILATING AND AIR CONDITIONING; maintain temperature in machine room between 60 and 100 degrees F.
 7. Accessories:
 - a. Telephone Cabinet: Install as shown.
 - b. Wall Pads: Deliver to City with use instructions, on final acceptance of Project.
 8. Start-up Maintenance: Provide regular examination, service and maintenance for three (3) months after final acceptance by City.

C. FIELD QUALITY CONTROL: Upon completion, load platform to rated capacity and demonstrate operation in presence of Architect and Inspector.

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Division 15 through 20 - UNASSIGNED

NOT USED

* End Division 20 *

Division 21 - FIRE SUPPRESSION

WET-PIPE SPRINKLER SYSTEMS

Section 21 13 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental Conditions, and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following fire-suppression piping inside the building:
 1. Automatic wet-type, sprinkler system.

1.3 DEFINITIONS

- A. CPVC: Chlorinated polyvinyl chloride plastic.
- B. CR: Chlorosulfonated polyethylene synthetic rubber.
- C. High-Pressure Piping System: Fire-suppression piping system designed to operate at working pressure higher than standard 175 psig.
- D. PE: Polyethylene plastic.
- E. Underground Service-Entrance Piping: Underground service piping below the building.

1.4 SYSTEM DESCRIPTIONS

- A. Automatic Wet-Type, Sprinkler System: Has open water-supply valve with pressure maintained and is capable of supplying water demand.

1.5 PERFORMANCE REQUIREMENTS

- A. Standard Piping System Component Working Pressure: Listed for at least 175 psig.
- B. Fire-suppression sprinkler system design shall be approved by authorities having jurisdiction.
 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 2. Sprinkler Occupancy Hazard Classifications:
 - a. Building Service Areas: Ordinary Hazard, Group 1.
 - b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - c. General Storage Areas: Ordinary Hazard, Group 1.
 - d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - e. Office and Public Areas: Light Hazard.
 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
 4. Maximum Protection Area per Sprinkler: Per UL listing.
 5. Maximum Protection Area per Sprinkler:
 - a. Office Spaces: 225 sq. ft.
 - b. Storage Areas: 130 sq. ft.
 - c. Mechanical Equipment Rooms: 130 sq. ft.
 - d. Electrical Equipment Rooms: 130 sq. ft.
 - e. Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.
 6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13, unless otherwise indicated:
 - a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
 - b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.
- C. Seismic Performance: Fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to NFPA 13 and ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.6 SUBMITTALS

- A. Product Data: For the following:
1. Piping materials, including dielectric fittings, flexible connections, and sprinkler specialty fittings.
 2. Pipe hangers and supports, including seismic restraints.
 3. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
 4. Air compressors, including electrical data.
 5. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
 6. Hose connections, including size, type, and finish.
 7. Hose stations, including size, type, and finish of hose connections; type and length of fire hoses; finish of fire hose couplings; type, material, and finish of nozzles; and finish of rack.
 8. Roof hose cabinets.
 9. Monitors.
 10. Fire department connections, including type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
 11. Alarm devices, including electrical data.
- B. Shop Drawings:
1. Proceed with preparation of shop drawings immediately upon receiving an authorization to proceed for the project. Submit prior to material fabrication, order and installation.
 2. In addition to the requirements specified elsewhere, the shop drawings shall include the following:
 - a. Piping elevations.
 - b. Double line piping (4" and larger).
 - c. Actual size of purchased equipment.
 - d. Access panels including ceiling panels.
 - e. Access clearances for equipment.
 - f. Diagram power, signal and control wiring.
 - g. Locations of structural penetrations such as beams.
 - h. Actual location of control panels and power connections to equipment.
 - i. Color coded duct and piping based on material used.
 - j. Minimum 1/4" scale drawings.
 - k. Label and tag schedule for equipment.
 - l. Pipe fittings to clear beams or tight areas.
 - m. Sprinkler Head locations coordinated with ductwork, lights, ceiling diffusers, supply/return/exhaust registers, reflected ceiling plan and structural beams.
 - n. Point of connection to utilities outside the building.
 - o. Sections or 3-D drawings of congested areas.
 - p. Grid lines.
 3. Coordinate with other trades. Submit a copy to General Contractor for distribution to other trades, including electrical and fire sprinkler contractor.
 4. Submit to commissioning agent for approval to assure design intent is met.
 5. Upon receiving approval from commissioning agent, submit a copy of shop drawings to mechanical engineer.
- C. Fire-hydrant flow test report.
- D. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations, if applicable.
- E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
- F. Welding certificates.
- G. Field quality-control test reports.

- H. Operation and Maintenance Data: For standpipe and sprinkler specialties to include in emergency, operation, and maintenance manuals.
- 1.7 QUALITY ASSURANCE
 - A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
 - B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
 - C. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."
 - 2. NFPA 14, "Installation of Standpipe, Private Hydrant, and Hose Systems."
 - 3. NFPA 230, "Fire Protection of Storage."
- 1.8 COORDINATION
 - A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- 1.9 EXTRA MATERIALS
 - A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounting, steel cabinet with hinged cover, with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
- 2.2 DUCTILE-IRON PIPE AND FITTINGS
 - A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell end and plain end.
 - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern.
 - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron gland, rubber gasket, and steel bolts and nuts.
 - B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell end and plain end.
 - 1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern.
 - 2. Gaskets: AWWA C111, rubber.
 - C. Grooved-End, Ductile-Iron Pipe: AWWA C151, with factory- or field-formed, radius-cut-grooved ends according to AWWA C606.
 - 1. Grooved-Joint Piping Systems:
 - a. Manufacturers:
 - 1) Victaulic Co. of America.
 - 2) Or equal.
 - b. Grooved-End Fittings: ASTM A 536, ductile-iron casting with OD matching ductile-iron-pipe OD and cement lining.
 - c. Grooved-End-Pipe Couplings: AWWA C606, gasketed fitting matching ductile-iron-pipe OD. Include ductile-iron housing with keys matching ductile-iron-pipe and fitting grooves, prelubricated rubber gasket with center leg, and steel bolts and nuts.
 - d. Grooved-End-Pipe Transition Coupling: UL 213 and AWWA C606, gasketed fitting with end matching ductile-iron-pipe OD and end matching steel-pipe OD. Include

ductile-iron housing with key matching ductile-iron-pipe groove and key matching steel-pipe groove, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.

- e. Grooved-End Transition Flange: UL 213, gasketed fitting with key for ductile-iron-pipe dimensions. Include flange-type, ductile-iron housing with rubber gasket listed for use with housing and steel bolts and nuts.

2.3 STEEL PIPE AND FITTINGS

- A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed threaded ends.

- 1. Cast-Iron Threaded Flanges: ASME B16.1.
- 2. Malleable-Iron Threaded Fittings: ASME B16.3.
- 3. Gray-Iron Threaded Fittings: ASME B16.4.
- 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe hot-dip galvanized where indicated. Include ends matching joining method.
- 5. Steel Threaded Couplings: ASTM A 865 hot-dip galvanized-steel pipe where indicated.

- B. Grooved-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed, square-cut- or roll-grooved ends.

1. Grooved-Joint Piping Systems:

- a. Manufacturers:
 - 1) Anvil International, Inc.
 - 2) Central Sprinkler Corp.
 - 3) Victaulic Co. of America.
- b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
- c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.

- C. Threaded-End, Schedule 30 Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and equal to or greater than Schedule 30; or ASTM A 795 and ASME B36.10M, Schedule 30 wrought-steel pipe with factory- or field-threaded ends.

- 1. Cast-Iron Threaded Flanges: ASME B16.1.
- 2. Malleable-Iron Threaded Fittings: ASME B16.3.
- 3. Gray-Iron Threaded Fittings: ASME B16.4.
- 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe. Include ends matching joining method.
- 5. Steel Threaded Couplings: ASTM A 865.

- D. Grooved-End, Schedule 30 Steel Pipe: ASTM A 135 or ASTM A 795, with wall thickness less than Schedule 40 and equal to or greater than Schedule 30; or ASTM A 795 and ASME B36.10M, Schedule 30 wrought-steel pipe; with factory- or field-formed, roll-grooved ends.

1. Grooved-Joint Piping Systems:

- a. Manufacturers:
 - 1) Anvil International, Inc.
 - 2) Central Sprinkler Corp.
 - 3) Victaulic Co. of America.
 - 4) Or equal.
- b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
- c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron

- housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
- E. Grooved-End, Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10; with factory- or field-formed, roll-grooved ends.
1. Grooved-Joint Piping Systems:
- a. Manufacturers:
 - 1) Anvil International, Inc.
 - 2) Central Sprinkler Corp.
 - 3) Victaulic Co. of America.
 - 4) Or equal.
 - b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
 - c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
- 2.4 DIELECTRIC FITTINGS
- A. Assembly shall be copper alloy, ferrous, and insulating materials with ends matching piping system.
- B. Dielectric Unions: Factory-fabricated assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material that isolates dissimilar materials and ends with inside threads according to ASME B1.20.1.
1. Manufacturers:
- a. Watts Industries, Inc.; Water Products Div.
 - b. Zurn Industries, Inc.; Wilkins Div.
 - c. Or equal.
- 2.5 CORROSION-PROTECTIVE ENCASEMENT FOR PIPING
- A. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch minimum thickness, tube or sheet.
- 2.6 SPRINKLER SPECIALTY FITTINGS
- A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig minimum working-pressure rating, and made of materials compatible with piping. Sprinkler specialty fittings shall have 250-psig minimum working-pressure rating if fittings are components of high-pressure piping system.
- B. Outlet Specialty Fittings:
1. Manufacturers:
- a. Anvil International, Inc.
 - b. Central Sprinkler Corp.
 - c. Victaulic Co. of America.
 - d. Or equal.
2. Mechanical-T and -Cross Fittings: UL 213, ductile-iron housing with gaskets, bolts and nuts, and threaded, locking-lug, or grooved outlets.
3. Snap-On and Strapless Outlet Fittings: UL 213, ductile-iron housing or casting with gasket and threaded outlet.
- C. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.
1. Manufacturers:
- a. Central Sprinkler Corp.
 - b. Viking Corp.
 - c. Victaulic Co. of America.
 - d. Or equal.
- D. Sprinkler Branch-Line Test Fittings: Brass body with threaded inlet, capped drain outlet, and threaded outlet for sprinkler.
1. Manufacturers:

- a. Elkhart Brass Mfg. Co., Inc.
 - b. Fire-End and Croker Corp.
 - c. Potter-Roemer; Fire-Protection Div.
 - d. Or equal.
- E. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.
- 1. Manufacturers:
 - a. AGF Manufacturing Co.
 - b. Central Sprinkler Corp.
 - c. Triple R Specialty of Ajax, Inc.
 - d. Or equal.
- F. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.
- 1. Manufacturers:
 - a. CECA, LLC.
 - b. Merit.
 - c. Or equal.
- 2.7 LISTED FIRE-PROTECTION VALVES
- A. Valves shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Valves shall have 250-psig minimum pressure rating if valves are components of high-pressure piping system.
- B. Gate Valves with Wall Indicator Posts:
- 1. Gate Valves: UL 262, cast-iron body, bronze mounted, with solid disc, nonrising stem, operating nut, and flanged ends.
 - 2. Indicator Posts: UL 789, horizontal-wall type, cast-iron body, with operating wrench, extension rod, locking device, and cast-iron barrel.
 - 3. Manufacturers:
 - a. Grinnell Fire Protection.
 - b. McWane, Inc.; Kennedy Valve Div.
 - c. NIBCO.
 - d. Stockham.
 - e. Or equal.
- C. Ball Valves: Comply with UL 1091, except with ball instead of disc.
- 1. NPS 1-1/2 and Smaller: Bronze body with threaded ends.
 - 2. NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - 3. NPS 3: Ductile-iron body with grooved ends.
 - 4. Manufacturers:
 - a. NIBCO.
 - b. Victaulic Co. of America.
 - c. Or equal.
- D. Butterfly Valves: UL 1091.
- 1. NPS 6 and Smaller: Bronze body with threaded ends.
 - a. Manufacturers:
 - 1) Global Safety Products, Inc.
 - 2) Milwaukee Valve Company.
 - 3) Or equal.
- E. Check Valves NPS 2 and Larger: UL 312, swing type, cast-iron body with flanged or grooved ends.
- 1. Manufacturers:
 - a. American Cast Iron Pipe Co.; Waterous Co.
 - b. Central Sprinkler Corp.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Victaulic Co. of America.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. Or equal.

- F. Gate Valves: UL 262, OS&Y type.
 - 1. NPS 6 and Smaller: Bronze body with threaded ends.
 - a. Manufacturers:
 - 1) Crane Co.; Crane Valve Group; Crane Valves.
 - 2) Hammond Valve.
 - 3) NIBCO.
 - 4) Or equal.
 - G. Indicating Valves: UL 1091, with integral indicating device and ends matching connecting piping.
 - 1. Indicator: Electrical, 115-V ac, prewired, 2-circuit, supervisory switch Visual.
 - 2. NPS 2 and Smaller: Ball or butterfly valve with bronze body and threaded ends.
 - a. Manufacturers:
 - 1) Milwaukee Valve Company.
 - 2) NIBCO.
 - 3) Victaulic Co. of America.
 - 4) Or equal.
 - 3. NPS 2-1/2 and Larger: Butterfly valve with cast- or ductile-iron body; wafer type or with flanged or grooved ends.
 - a. Manufacturers:
 - 1) Milwaukee Valve Company.
 - 2) NIBCO.
 - 3) Victaulic Co. of America.
 - 4) Or equal.
- 2.8 UNLISTED GENERAL-DUTY VALVES
- A. Ball Valves NPS 2 and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig minimum CWP rating, blowout-proof stem, and threaded ends.
 - B. Check Valves NPS 2 and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.
 - C. Gate Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.
 - D. Globe Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.
- 2.9 SPECIALTY VALVES
- A. Sprinkler System Control Valves: UL listed or FMG approved, cast- or ductile-iron body with flanged or grooved ends, and 175-psig minimum pressure rating. Control valves shall have 300-psig pressure rating if valves are components of high-pressure piping system.
 - 1. Manufacturers:
 - a. Central Sprinkler Corp.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Victaulic Co. of America.
 - d. Or equal.
 - 2. Alarm Check Valves: UL 193, designed for horizontal or vertical installation, with bronze grooved seat with O-ring seals, single-hinge pin, and latch design. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
 - a. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
 - b. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
 - 3. Dry-Pipe Valves: UL 260, differential type; with bronze seat with O-ring seals, single-hinge pin, and latch design. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Air-Pressure Maintenance Device: UL 260, automatic device to maintain correct air pressure in piping. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to

maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and 175-psig maximum inlet pressure.

- 1) Manufacturers:
 - a) AFAC Inc.
 - b) Central Sprinkler Corp.
 - c) Reliable Automatic Sprinkler Co., Inc.
 - d) Viking Corp.
 - e) Or equal.

2.10 SPRINKLERS

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Sprinklers shall have 250-psig minimum pressure rating if sprinklers are components of high-pressure piping system.
- B. Manufacturers:
 1. Central Sprinkler Corp.
 2. Reliable Automatic Sprinkler Co., Inc.
 3. Star Sprinkler Inc.
- C. Automatic Sprinklers: With heat-responsive element complying with the following:
 1. UL 199, for nonresidential applications.
 2. UL 1626, for residential applications.
 3. UL 1767, for early-suppression, fast-response applications.
- D. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
 1. Open Sprinklers: UL 199, without heat-responsive element.
 - a. Orifice: 1/2 inch, with discharge coefficient K between 5.3 and 5.8.
 - b. Orifice: 17/32 inch, with discharge coefficient K between 7.4 and 8.2.
- E. Sprinkler types, features, and options as follows:
 1. Concealed ceiling sprinklers, including cover plate.
 2. Extended-coverage sprinklers.
 3. Flow-control sprinklers, with automatic open and shutoff feature.
 4. Flush ceiling sprinklers, including escutcheon.
 5. Pendent sprinklers.
 6. Pendent, dry-type sprinklers.
 7. Recessed sprinklers, including escutcheon.
 8. Sidewall sprinklers.
 9. Upright sprinklers.
- F. Sprinkler Finishes: Chrome plated, bronze, and painted.
- G. Special Coatings: Wax, lead, and corrosion-resistant paint.
- H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 1. Ceiling Mounting: Chrome-plated steel, 2 piece, with 1-inch vertical adjustment.
 2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- I. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.11 FIRE DEPARTMENT CONNECTIONS

- A. Manufacturers:
 1. Central Sprinkler Corp.
 2. Elkhart Brass Mfg. Co., Inc.
 3. Potter-Roemer; Fire-Protection Div.
- B. Wall-Type, Fire Department Connection: UL 405, 175-psig minimum pressure rating; with corrosion-resistant-metal body with brass inlets, brass wall escutcheon plate, brass lugged caps with gaskets and brass chains, and brass lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets, and escutcheon plate with marking similar to "AUTO SPKR & STANDPIPE."
 1. Type: Flush, with two inlets and square or rectangular escutcheon plate.

2. Type: Exposed, projecting, with two inlets and round escutcheon plate.
 3. Finish: Rough chrome-plated Polished brass.
 - C. Exposed, Freestanding-Type, Fire Department Connection: UL 405, 300-psig pressure rating; with corrosion-resistant-metal body, brass inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, and bottom outlet with pipe threads. Include brass lugged caps, gaskets, and brass chains; brass lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high, brass sleeve; and round, floor, brass escutcheon plate with marking "AUTO SPKR & STANDPIPE."
 1. Finish Including Sleeve: Rough chrome-plated Polished brass.
- 2.12 ALARM DEVICES
- A. Electrically Operated Alarm: UL 464, with 10-inch- diameter, vibrating-type, metal alarm bell with red-enamel factory finish and suitable for outdoor use.
 1. Manufacturers:
 - a. Potter Electric Signal Company.
 - b. System Sensor.
 - c. Or equal.
 - B. Water-Flow Indicator: UL 346, electrical-supervision, paddle-operated-type, water-flow detector with 250-psig pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
 1. Manufacturers:
 - a. Grinnell Fire Protection.
 - b. ITT McDonnell & Miller.
 - c. Potter Electric Signal Company.
 - d. Or equal.
 - C. Pressure Switch: UL 753, electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
 1. Manufacturers:
 - a. Grinnell Fire Protection.
 - b. Potter Electric Signal Company.
 - c. System Sensor.
 - d. Viking Corp.
 - e. Or equal.
 - D. Valve Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
 1. Manufacturers:
 - a. McWane, Inc.; Kennedy Valve Div.
 - b. Potter Electric Signal Company.
 - c. System Sensor.
 - d. Or equal.
 - E. Indicator-Post Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.
 1. Manufacturers:
 - a. Potter Electric Signal Company.
 - b. System Sensor.
 - c. Or equal.
- 2.13 PRESSURE GAGES
- A. Manufacturers:
 1. AGF Manufacturing Co.
 2. Marsh Bellofram.
 3. WIKA Instrument Corporation.
 4. Or equal.

- B. Description: UL 393, 3-1/2- to 4-1/2-inch- diameter, dial pressure gage with range of 0 to 300 psig.
 - 1. Water System Piping: Include caption "WATER" or "AIR/WATER" on dial face.
 - 2. Air System Piping: Include retard feature and caption "AIR" or "AIR/WATER" on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13, NFPA 14, and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 EXAMINATION

- A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.
- B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PIPING APPLICATIONS, GENERAL

- A. Shop weld pipe joints where welded piping is indicated.
- B. Do not use welded joints for galvanized-steel pipe.
- C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- D. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
- E. Underground Service-Entrance Piping: Ductile-iron, mechanical-joint pipe and fittings and restrained joints. Include corrosion-protective encasement.
- F. Underground Service-Entrance Piping: Ductile-iron, grooved-end pipe and fittings; grooved-end-pipe couplings; and grooved joints. Include corrosion-protective encasement.

3.4 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Listed Fire-Protection Valves: UL listed and FMG approved for applications where required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use ball, butterfly, or gate valves.
 - 2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use ball, butterfly, or gate valves.
 - b. Throttling Duty: Use ball or globe valves.

3.5 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- M. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- N. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- O. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- P. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.
- Q. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
- R. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- S. Plastic-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
- 3.6 SERVICE-ENTRANCE PIPING
- A. Connect fire-suppression piping to water-service piping of size and in location indicated for service entrance to building. Refer to Division 22 Section "Facility Water Distribution Piping" for exterior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping. Refer to Division 22 Section "Facility Water Distribution Piping" for backflow preventers.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.
- 3.7 WATER-SUPPLY CONNECTION
- A. Connect fire-suppression piping to building's interior water distribution piping. Refer to Division 22 Section "Domestic Water Piping" for interior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water distribution piping. Refer to Division 22 Section for backflow preventers.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.
- 3.8 PIPING INSTALLATION
- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

- B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
 - C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
 - D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
 - E. Install unions adjacent to each valve in pipes NPS 2 (DN50) and smaller.
 - F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN65) and larger end connections.
 - G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
 - H. Install sprinkler piping with drains for complete system drainage.
 - I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
 - J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
 - K. Install alarm devices in piping systems.
 - L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
 - M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
 - N. Fill sprinkler system piping with water.
 - O. Install sleeves for piping penetrations of walls, ceilings, and floors.
 - P. Install sleeve seals for piping penetrations of concrete walls and slabs.
 - Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.
- 3.9 VALVE INSTALLATION
- A. Install listed fire-protection valves, unlisted general-duty valves, specialty valves and trim, controls, and specialties according to NFPA 13 and NFPA 14 and authorities having jurisdiction.
 - B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.
 - C. Valves for Wall-Type Fire Hydrants: Install nonrising-stem gate valve in water-supply pipe.
 - D. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
 - E. Specialty Valves:
 - 1. Alarm Check Valves: Install in vertical position for proper direction of flow, including bypass check valve and retarding chamber drain-line connection.
 - 2. Dry-Pipe Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Air-Pressure Maintenance Devices for Dry-Pipe Systems: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.
 - b. Install air compressor and compressed-air supply piping.
 - c. Install compressed-air supply piping from building's compressed-air piping system.
- 3.10 SPRINKLER APPLICATIONS
- A. Drawings indicate sprinkler types to be used. Where specific types are not indicated, use the following sprinkler types:
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Rooms with Suspended Ceilings: Semi-Recessed sprinklers Concealed sprinklers Pendent, recessed, flush, and concealed sprinklers, as indicated.
 - 3. Wall Mounting: Sidewall sprinklers.

4. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers.
5. Sprinkler Finishes:
- a. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.
 - b. Semi-Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
- 3.11. SPRINKLER INSTALLATION
- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels and tiles.
 - B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.
- 3.12. MONITOR INSTALLATION
- A. Install monitor bases securely attached to building substrate.
- 3.13. FIRE HYDRANT INSTALLATION
- A. Install fire hydrants mounted in vertical wall with shutoff valve inside building in heated space.
- 3.14. FIRE DEPARTMENT CONNECTION INSTALLATION
- A. Install wall-type, fire department connections in vertical wall.
 - B. Install freestanding-type, fire department connections in level surface.
 - 1. Install protective pipe bollards on three sides of each fire department connection. Refer to Division 5 Section "Metal Fabrications" for pipe bollards.
 - C. Install ball drip valve at each check valve for fire department connection.
- 3.15. CONNECTIONS
- A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Install piping adjacent to equipment to allow service and maintenance.
 - C. Connect water-supply piping to fire-suppression piping. Include backflow preventer between potable-water piping and fire-suppression piping. Refer to Division 22 Sections for backflow preventers.
 - D. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
 - E. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.
 - F. Electrical Connections: Power wiring is specified in Division 26.
 - G. Connect alarm devices to fire alarm.
 - H. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- 3.16. LABELING AND IDENTIFICATION
- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 NFPA 13 and NFPA 14 NFPA 14 and in Division 23 Section "Identification for HVAC Piping and Equipment."
- 3.17. FIELD QUALITY CONTROL
- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Energize circuits to electrical equipment and devices.
 - 4. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 5. Flush, test, and inspect standpipe systems according to NFPA 14, "System Acceptance" Chapter.
 - 6. Coordinate with fire alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire department equipment.
 - B. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.18 CLEANING AND PROTECTION

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.
- C. Protect sprinklers from damage until Substantial Completion.

3.19 DEMONSTRATION

- A. Engage a factory-authorized service representative to train State's maintenance personnel to adjust, operate, and maintain specialty valves.

* End Division 21 *

Division 22 - PLUMBING

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

Section 22 05 17

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 1. Sleeves.
 2. Stack-sleeve fittings.
 3. Sleeve-seal systems.
 4. Sleeve-seal fittings.
 5. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 STACK-SLEEVE FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Smith, Jay R. Mfg. Co.
 2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
 3. Or approved equal.
- B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
 1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Metraflex Company (The).
 2. Or approved equal.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Carbon steel.
 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Presealed Systems.
 2. Or approved equal.
- B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.
- 2.5 GROUT
- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
 - B. Characteristics: Nonshrink; recommended for interior and exterior applications.
 - C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.
 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 1. Cut sleeves to length for mounting flush with both surfaces.
 2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 92 10 - Joint Sealers.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 84 00 - Firestopping.

3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 07 60 00 - Flashing and Sheet Metal.
 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.
 4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 5. Using grout, seal the space around outside of stack-sleeve fittings.
- B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Galvanized-steel-pipe sleeves.
 - 5. Interior Partitions:
 - a. Piping Smaller Than NPS 6 (DN 150): Galvanized-steel-pipe sleeves.

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ESCUTCHEONS FOR PLUMBING & PIPING Section 22 05 18

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

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GENERAL-DUTY VALVES FOR PLUMBING PIPING

Section 22 05 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Bronze swing check valves.
3. Lubricated plug valves.

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 2. ASME B31.1 for power piping valves.
 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handwheel: For valves other than quarter-turn types.
 - 2. Handlever: For quarter-turn valves NPS 6 (DN 150) and smaller except plug valves.
 - 3. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 5 plug valves, for each size square plug-valve head.
- E. Valves in Insulated Piping: With 2-inch (50-mm) stem extensions and the following features:
 - 1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Grooved: With grooves according to AWWA C606.
 - 3. Solder Joint: With sockets according to ASME B16.18.
 - 4. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

- A. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Red-White Valve Corporation.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 600 psig (4140 kPa).
 - d. Body Design: Three piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass.
 - j. Port: Full.

2.3 BRONZE SWING CHECK VALVES

- A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Red-White Valve Corporation.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.

- e. Ends: Threaded.
 - f. Disc: PTFE or TFE.
- 2.4 LUBRICATED PLUG VALVES
- A. Class 125, Regular-Gland, Lubricated Plug Valves with Threaded Ends:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Nordstrom Valves, Inc.
 - b. Or approved equal.
 - 2. Description:
 - a. Standard: MSS SP-78, Type II.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - d. Pattern: Regular or short.
 - e. Plug: Cast iron or bronze with sealant groove.
 - B. Class 125, Regular-Gland, Lubricated Plug Valves with Flanged Ends:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Nordstrom Valves, Inc.
 - b. Or approved equal.
 - 2. Description:
 - a. Standard: MSS SP-78, Type II.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - d. Pattern: Regular or short.
 - e. Plug: Cast iron or bronze with sealant groove.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, butterfly, gate, or plug valves.

2. Pump-Discharge Check Valves:
 - a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with nonmetallic disc.
 - B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
 - C. Select valves, except wafer types, with the following end connections:
 1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
- 3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE
- A. Pipe NPS 3 (DN 50) and Smaller:
 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 2. Ball Valves: Three piece, full port, bronze with stainless-steel trim.
 3. Bronze Swing Check Valves: Class 125, nonmetallic disc.

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HANGERS & SUPPORT FOR PLUMBING PIPING & EQUIPMENT Section 22 05 29

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 1. Metal pipe hangers and supports.
 2. Trapeze pipe hangers.
 3. Metal framing systems.
 4. Thermal-hanger shield inserts.
 5. Fastener systems.
 6. Pipe stands.
 7. Pipe positioning systems.
 8. Equipment supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 1. Trapeze pipe hangers.
 2. Metal framing systems.
 3. Fiberglass strut systems.
 4. Pipe stands.
 5. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Detail fabrication and assembly of trapeze hangers.
 2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

- A.** Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Unistrut Corporation; Tyco International, Ltd.
 - b. Cooper B-Line, Inc.
 - c. Or approved equal.
2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturred lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Paint Coating: Epoxy.
9. Plastic Coating: Epoxy.

2.4 FASTENER SYSTEMS

- A.** Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

- B.** Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 PIPE STANDS

- A.** General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support piping.

- B.** Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe.

2.6 PIPE POSITIONING SYSTEMS

- A.** Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.7 EQUIPMENT SUPPORTS

- A.** Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D. Fastener System Installation:
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 22 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- M. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

- a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
 - e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
 5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- 3.2 EQUIPMENT SUPPORTS
- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
 - B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
 - C. Provide lateral bracing, to prevent swaying, for equipment supports.
- 3.3 METAL FABRICATIONS
- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
 - B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
 - C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.
- 3.4 ADJUSTING
- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
 - B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).
- 3.5 PAINTING
- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
 - B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
- 3.6 HANGER AND SUPPORT SCHEDULE
- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
 - B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.
- F. Use padded hangers for piping that is subject to scratching.
- G. Use thermal-hanger shield inserts for insulated piping and tubing.
- H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
 - 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 - 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 - 17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
 - 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.

19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (DN 50 to DN 600) if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 (DN 50 to DN 750) if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.
- J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb (340 kg).
 - b. Medium (MSS Type 32): 1500 lb (680 kg).
 - c. Heavy (MSS Type 33): 3000 lb (1360 kg).
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
- Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

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VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT Section 22 05 48

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 1. Seismic restraint devices.
 2. Vibration isolators
 3. Restraining braces and cables.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 1. Site Class as Defined in the IBC: D.
 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: 2.5.
 - c. Component Amplification Factor: 2.5.
 3. Design Spectral Response Acceleration at Short Periods (0.2 Second).
 4. Design Spectral Response Acceleration at 1-Second Period:.

1.5 SUBMITTALS

- A. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators, seismic restraints, and for designing vibration isolation bases.
 2. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Include the following:
 1. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 2. Seismic-Restraint Details: Detail fabrication and attachment of seismic restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

Welding certificates.

Manufacturer Seismic Qualification Certification: Submit certification that all specified equipment will withstand seismic forces identified in "Performance Requirements" Article above. Include the following:

3. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified. In addition, units field wired to an emergency power source unit will be fully operational after the seismic event.
4. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
5. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproved by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Amber/Booth Company, Inc.
 2. Hilti, Inc.
 3. Mason Industries.
 4. TOLCO Incorporated; a brand of NIBCO INC.
 5. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- E. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

2.2 VIBRATION ISOLATORS

Manufacturers:

1. Amber/Booth Company, Inc.

2. Mason Industries, Inc.
 3. Vibration Mountings & Controls/Korfund.
- Restrained Elastomeric Mounts: All-directional elastomeric mountings with seismic restraint.
4. Materials: Cast-ductile-iron housing containing two separate and opposing, molded, bridge-bearing neoprene elements that prevent central threaded sleeve and attachment bolt from contacting the casting during normal operation.
 5. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 1. Powder coating on springs and housings.
 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 3. Baked enamel or powder coat for metal components on isolators for interior use.
 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment Restraints:
 1. Install seismic snubbers on plumbing equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
 2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inches (3.2 mm).
 3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES providing required submittals for component.
- B. Piping Restraints:
 1. Comply with requirements in MSS SP-127.
 2. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
 3. Brace a change of direction longer than 12 feet (3.7 m).
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES providing required submittals for component.
- E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- F. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

- G. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- H. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 5. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.
- 3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION
 - A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 221116 "Domestic Water Piping" for piping flexible connections.
- 3.5 FIELD QUALITY CONTROL
 - A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - B. Perform tests and inspections.
 - C. Tests and Inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 - 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 - 5. Test to 90 percent of rated proof load of device.
 - 6. Measure isolator restraint clearance.
 - 7. Measure isolator deflection.
 - 8. Verify snubber minimum clearances.
 - 9. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 10. Air-Mounting System Operational Test: Test the compressed-air leveling system.
 - 11. Test and adjust air-mounting system controls and safeties.
 - 12. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
 - D. Remove and replace malfunctioning units and retest as specified above.
 - E. Prepare test and inspection reports.
- 3.6 ADJUSTING
 - A. Adjust isolators after piping system is at operating weight.
 - B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

- C. Adjust active height of sprint isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

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IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

Section 22 05 53

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Valve tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Material and Thickness: Stainless steel, 0.025-inch (0.64-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 - 3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 4. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 2. Lettering Size: At least 1-1/2 inches (38 mm) high.
- 2.3 VALVE TAGS
- A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.
 1. Tag Material: Brass, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
 - B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- B. Pipe Label Color Schedule:
 1. Domestic Water Piping:
 - a. Background Color: Green.
 - b. Letter Color: White.

3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches (38 mm), round.

3.5 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

* * *

PLUMBING PIPING INSULATION

Section 22 07 19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 1. Domestic cold-water piping.
 2. Sanitary waste piping exposed to freezing conditions.

- B. Related Sections:

1. Section 220716 "Plumbing Equipment Insulation."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

- C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
3. Sheet Jacket Materials: 12 inches (300 mm) square.
4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

- C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the

location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:
 - a. One 10-foot (3-m) section of NPS 2 (DN 50) straight pipe.
 - b. One each of a 90-degree threaded, welded, and flanged elbow.
 - c. One each of a threaded, welded, and flanged tee fitting.
 - d. One NPS 2 (DN 50) or smaller valve, and one NPS 2-1/2 (DN 65) or larger valve.
 - e. Four support hangers including hanger shield and insert.
 - f. One threaded strainer and one flanged strainer with removable portion of insulation.
 - g. One threaded reducer and one welded reducer.
 - h. One pressure temperature tap.
 - i. One mechanical coupling.
 2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Obtain Architect's approval of mockups before starting insulation application.
 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed.
- D. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Supply and Drain Protective Shielding Guards: ICC A117.1.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.
- 1.7 COORDINATION
- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
 - C. Coordinate installation and testing of heat tracing.
- 1.8 SCHEDULING
- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
 - B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
 - F. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Products: Subject to compliance with requirements, provide one of the following :
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000-Degree Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
 - 2. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- 2.2 INSULATING CEMENTS
- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ramco Insulation, Inc.; Super-Stik.
 - b. Or approved equal.
- 2.3 ADHESIVES
- A. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Products: Subject to compliance with requirements, provide the following provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 - d. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- 2.4 FACTORY-APPLIED JACKETS
- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
- 2.5 SECUREMENTS
- A. Bands:
 - 1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - a. ITW Insulation Systems; Gerrard Strapping and Seals.
 - b. RPR Products, Inc.; Insul-Mate Strapping and Seals.
 - c. Or approved equal.
 - 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with closed seal.
 - B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- C. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- D. Install multiple layers of insulation with longitudinal and end seams staggered.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) 4 inches (100 mm) o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.
- 3.4 PENETRATIONS
- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
 - C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
 - D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.
- 3.8 FINISHES
- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
 - B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
 - C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
 - D. Do not field paint aluminum or stainless-steel jackets.
- 3.9 FIELD QUALITY CONTROL
- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - B. Perform tests and inspections.
 - C. Tests and Inspections:
 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
 - D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.
- 3.10 PIPING INSULATION SCHEDULE, GENERAL
- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
 - B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- 3.11 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE
- A. Domestic Water Piping:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches (50 mm) thick.
- 3.12 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE
- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
 - B. If more than one material is listed, selection from materials listed is Contractor's option.

- C. Piping, Exposed:
 - 1. Stainless Steel, Type 304 or Type 316, Corrugated with Z-Shaped Locking Seam: 0.010 inch (0.25 mm) 0.016 inch (0.41 mm) 0.020 inch (0.51 mm) 0.024 inch (0.61 mm) thick.
- 3.13 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET
 - A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

* * *

COMMISSIONING OF PLUMBING EQUIPMENT

Section 22 08 00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plumbing commissioning description.
2. Plumbing commissioning responsibilities.

B. Related Sections:

1. Section 26 08 00 – Commissioning of Electrical Equipment: Electrical systems commissioning requirements.
2. Section 23 08 00 – Commissioning of HVAC: HVAC systems commissioning requirements.
3. Section 01 91 00 – Building Commissioning
4. General Requirements per Division 1

1.2 REFERENCES

A. Associated Air Balance Council:

1. AABC - AABC Commissioning Guideline.

1.3 COMMISSIONING DESCRIPTION

A. Plumbing commissioning process includes the following tasks:

1. Testing and startup of Plumbing equipment and systems.
2. Equipment and system verification checks.
3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.
4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.
5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.
6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.
8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.
9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:

1. Domestic water heaters.
2. Pumps.
3. Cold and hot water distribution.
4. Fixtures with or without automatic flush valves.
5. Piping systems.

1.4 COMMISSIONING SUBMITTALS

A. Section 01 91 00 - Commissioning: Requirements for commissioning submittals.

B. Draft Forms: Draft forms of the system verification forms and the functional performance test checklist will be produced and issued as part of the Commissioning Plan by the Commissioning Authority.

C. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use forms provided by the Commissioning Authority as guidelines.

D. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance. Deficiencies should be reported to the General Contractor, Owner, Architect/Engineer, and Commissioning Authority.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures.
- B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.
- C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

1.6 COMMISSIONING RESPONSIBILITIES

- A. Equipment or System Installer Commissioning Responsibilities:
 - 1. Attend commissioning meetings.
 - 2. Ensure controls installer performs assigned commissioning responsibilities as specified below.
 - 3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.
 - 4. Provide instructions and demonstrations for Owner's personnel.
 - 5. Ensure subcontractors perform assigned commissioning responsibilities.
 - 6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
 - 7. Develop startup and initial checkout plan using manufacturer's startup procedures and functional performance checklists for equipment and systems to be commissioned.
 - 8. During verification check and startup process, execute portions of checklists for equipment and systems to be commissioned.
 - 9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
 - 10. Provide manufacturer's representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
 - 11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
 - 12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.
 - 13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.
 - 14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.
 - 15. Provide factory supervised startup services for equipment and systems. Coordinate work with manufacturer and Commissioning Authority.
 - 16. Perform verification checks and startup on equipment and systems as specified.
 - 17. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.
 - 18. Perform operation and maintenance training sessions scheduled by Commissioning Authority.
 - 19. Conduct system orientation and inspection.
- B. Controls Installer Commissioning Responsibilities:
 - 1. Attend commissioning meetings.
 - 2. Review design for ability of systems to be controlled including the following:
 - a. Confirm that all of the proper hardware which is required exists to perform functional performance testing.
 - b. Confirm proper safeties and interlocks are included in design.
 - c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.
 - d. Confirm sensors selected are within device ranges.

- e. Review sequences of operation and obtain clarification from Architect/Engineer.
 - f. Indicate delineation of control between packaged controls and building automation system, listing BAS monitor points and BAS adjustable control points.
 - g. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.
3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other plumbing sections.
 4. Submit proposed procedures for performing control system point-to-point checks to Commissioning Authority and Architect/Engineer.
 5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.
 6. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan and requirements of Section 01 91 00.
 7. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.
 8. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.
 9. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.
- 1.7 COMMISSIONING MEETINGS
- A. Section 01 91 00 – Building Commissioning: Requirements for commissioning meetings.
 - B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.
- 1.8 SCHEDULING
- A. Section 01 32 14 - Progress Schedule: Requirements for scheduling.
 - B. Contractor to prepare schedule indicating anticipated start dates for the following:
 1. Piping system pressure testing.
 2. Piping system flushing and cleaning.
 3. Equipment and system startups.
 4. Control system checkout.
 5. Testing and adjusting.
 6. Plumbing system orientation and inspections.
 7. Operation and maintenance manual submittals.
 8. Training sessions.
 - C. Schedule seasonal tests of equipment and systems during peak weather conditions to observe full-load performance.
 - D. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy and use.
- 1.9 COORDINATION
- A. Section 01 31 00 – Project Management and Coordination.
 - B. Notify Commissioning Authority minimum of 3 weeks in advance of the following:
 1. Scheduled equipment and system startups.
 2. Scheduled control system checkout.
 3. Scheduled start of testing, adjusting, and balancing work.
 - C. Coordinate programming of automatic temperature control system with construction and commissioning schedules.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install additional balancing valves, access doors, test ports, and pressure and temperature taps required to provide a complete and balanced system in accordance with the Contract Documents.
- B. Place plumbing systems and equipment into full operation and continue operation during each working day of commissioning.

3.2 COMMISSIONING

- A. Functional Performance Tests:
 - 1. Test equipment at winter design temperatures.
 - 2. Test equipment at summer design temperatures with fully occupied building.
 - 3. Participate in testing delayed beyond Final Completion to test performance at peak seasonal conditions.
- B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.
- C. Warranty Period Re-Commissioning:
 - 1. Return to site minimum (8) eight months after Substantial Completion and before the expiration of correction / warranty period.
 - a. Review current equipment and system operation and condition of outstanding issues related to original and seasonal commissioning with Owner's personnel.
 - b. Interview Owner's personnel to identify problems or concerns regarding equipment and system operation.
 - c. Make suggestions for improvements and for recording changes in operation and maintenance manuals.
 - d. Identify deficiencies covered by warranty or original construction contract.
 - e. Assist Owner's personnel to develop reports, documents and requests for services to remedy outstanding problems.

* * *

DOMESTIC WATER PIPING

Section 22 11 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes domestic water piping inside the building.
- B. Related Sections include the following:
 - 1. Division 01 Sustainable Design Requirements – LEED Sections.
 - 2. Division 22 Sections for water distribution piping specialties.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Water Samples: Specified in Part 3 "Cleaning" Article.
- D. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- C. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- B. Hard Copper Tube: ASTM B 88, Types L, water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

4. Copper, Grooved-End Fittings: ASTM B 75 copper tube or ASTM B 584 bronze castings.
 - a. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.
- 2.4 PE ENCASEMENT
 - A. PE Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105 PE film, 0.008-inch minimum thickness, tube or sheet.
- 2.5 VALVES
 - A. Refer to Division 23 Section 230523 "General-Duty Valves for HVAC Piping" for bronze and cast-iron, general duty valve.
 - B. Refer to Division 22 Sections for balancing and drain valves.

PART 3 - EXECUTION

- 3.1 EXCAVATION
 - A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthmoving."
- 3.2 PIPE AND FITTING APPLICATIONS
 - A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
 - B. Flanges may be used on aboveground piping, unless otherwise indicated.
 - C. Grooved joints may be used on aboveground grooved-end piping.
 - D. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
 - E. Aboveground Domestic Water Piping: Use the following piping materials for each size range:
 1. NPS 1-1/2 and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.
 2. NPS 2 and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.
 - F. Underground Domestic Water Service Piping: Use the following piping materials for each size range.
 1. NPS 2 and Smaller: Soft Copper Tube, Type K; copper pressure fittings; and brazed joints.
 2. NPS 2-1/2 to NPS 3-1/2: Soft copper tube: Type K; copper pressure fitting; and brazed joints.
- 3.3 VALVE APPLICATIONS
 - A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 1. Shutoff Duty: Use bronze ball valves for piping NPS 2 and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 and larger.
 2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use ductile-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
 3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 4. Drain Duty: Hose-end drain valves.
- 3.4 PIPING INSTALLATION
 - A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
 - B. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."
 - C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 23 Section "Basic Mechanical Materials and Methods."
 - D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 23 Section "Basic Mechanical Materials and Methods."

- E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping," and drain valves and strainers are specified in Division 22 Sections.
 - F. Install water-pressure regulators downstream from shutoff valves. Water-pressure regulators are specified in Division 22 Sections.
 - G. Install domestic water piping level and plumb.
 - H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
 - I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
 - J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
 - L. Install piping to permit valve servicing.
 - M. Install piping free of sags and bends.
- 3.5 JOINT CONSTRUCTION
- A. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
 - B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- 3.6 HANGER AND SUPPORT INSTALLATION
- A. Seismic-restraint devices are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
 - B. Pipe hanger and support devices are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet: MSS Type 49, spring cushion rolls, if indicated.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
 - C. Install supports according to Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
 - D. Support vertical piping and tubing at base and at each floor.
 - E. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
 - F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
 - 7. NPS 6: 12 feet with 3/4-inch rod.
 - 8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.
 - G. Install supports for vertical steel piping every 15 feet.
 - H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.

3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 6. NPS 6: 10 feet with 5/8-inch rod.
 7. NPS 8: 10 feet with 3/4-inch rod.
- I. Install supports for vertical copper tubing every 10 feet.
 - J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.
- 3.7 CONNECTIONS
- A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Install piping adjacent to equipment and machines to allow service and maintenance.
 - C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
 - D. Connect domestic water piping to water-service piping with shutoff valve, and extend and connect to the following:
 1. Booster Pumps: Cold-water suction and discharge piping.
 2. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Sections for Plumbing Fixtures.
 4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.
- 3.8 FIELD QUALITY CONTROL
- A. Inspect domestic water piping as follows:
 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - B. Test domestic water piping as follows:
 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.

3.9 ADJUSTING

- A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
 2. Open shutoff valves to fully open position.
 3. Open throttling valves to proper setting.
 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 5. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

* * *

DOMESTIC WATER PIPING SPECIALTIES Section 22 11 19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following domestic water piping specialties:

1. Vacuum breakers.
2. Balancing valves.
3. Strainers.
4. Hose bibbs.
5. Wall hydrants.
6. Post hydrants.
7. Drain valves.
8. Water hammer arresters.
9. Trap-seal primer valves.

- B. Related Sections include the following:

1. Division 01 Sustainable Design Requirements – LEED Sections.
2. Division 22 Section "Domestic Water Piping" for water meters.
3. Division 22 Sections for water filters for water coolers.

1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: Diagram power, signal, and control wiring.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. NSF Compliance:
 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Rain Bird Corporation.
 - b. Toro Company (The); Irrigation Div.
 - c. Watts Industries, Inc.; Water Products Div.
 - d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1001.
3. Size: As required to match connected piping.
4. Body: Bronze.

5. Inlet and Outlet Connections: Threaded.
 6. Finish: Rough bronze.
- B. Hose-Connection Vacuum Breakers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Plumbing Products Group; Light Commercial Operation.
 2. Standard: ASSE 1011.
 3. Body: Bronze, non-removable, with manual drain.
 4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
 5. Finish: Rough bronze.
- 2.2 WATER PRESSURE-REDUCING VALVES
- A. Water Regulators:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Watts Industries, Inc.; Water Products Div.
 - b. Zurn Plumbing Products Group; Wilkins Div.
 2. Standard: ASSE 1003.
 3. Pressure Rating: Initial working pressure of 125 psig.
 4. Design Inlet Pressure: 125-psig minimum.
 5. Design Outlet Pressure Setting: 125-psig minimum.
 6. Body: Bronze 4 inch for and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for 6 inch and larger.
 7. End Connections: Threaded for and smaller; flanged for.
- B. Water Control Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CLA-VAL Automatic Control Valves.
 - b. Flomatic Corporation.
 - c. OCV Control Valves.
 - d. Watts Industries, Inc.; Ames Fluid Control Systems.
 - e. Watts Industries, Inc.; Watts ACV.
 - f. Zurn Plumbing Products Group; Wilkins Div.
 2. Description: Pilot-operation, diaphragm-type, single-seated main water control valve.
 3. Pressure Rating: Initial working pressure of minimum with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot-control valve, restrictor device, specialty fittings, and sensor piping.
 4. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.
 5. End Connections: Threaded for 2 inch and smaller; flanged for 2 ½ inch and larger.
- 2.3 BALANCING VALVES
- A. Copper-Alloy Calibrated Balancing Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. NIBCO INC.
 - b. Taco, Inc.
 - c. Watts Industries, Inc.; Water Products Div.
 2. Type: Y-pattern globe valve with two readout ports and memory setting indicator.
 3. Body: Bronze.
 4. Size: Same as connected piping, but not larger than.
 5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.
- 2.4 STRAINERS FOR DOMESTIC WATER PIPING
- A. Y-Pattern Strainers:
1. Pressure Rating: minimum, unless otherwise indicated.

2. Body: Bronze for 2 inch and smaller; ductile iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for 2 ½ inch and larger.
 3. End Connections: Threaded for 2 inch and smaller; flanged for 2 ½ inch and larger.
 4. Screen: Stainless steel with rounds perforations, unless otherwise indicated.
 5. Perforation Size:
 - a. Manufacturer standard.
 6. Drain: Pipe plug.
- 2.5 HOSE BIBBS
- A. Hose Bibbs HB-1:
1. Standard: ASME A112.18.1 for sediment faucets.
 2. Body Material: Bronze.
 3. Seat: Bronze, replaceable.
 4. Supply Connections: threaded or solder-joint inlet.
 5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
 6. Pressure Rating:
 7. Vacuum Breaker: Integral, non-removable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
 8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel-plated.
 9. Finish for Service Areas: Chrome or nickel-plated.
 10. Finish for Finished Rooms: Chrome or nickel-plated.
 11. Operation for Equipment Rooms: Wheel handle or operating key.
 12. Operation for Service Areas: Operating key.
 13. Operation for Finished Rooms: Operating key.
 14. Include operating key with each operating-key hose bibb.
 15. Include integral wall flange with each chrome- or nickel-plated hose bibb.
- 2.6 DRAIN VALVES
- A. Ball-Valve-Type, Hose-End Drain Valves:
1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
 2. Pressure Rating: minimum CWP.
 3. Body: Copper alloy.
 4. Ball: Chrome-plated brass.
 5. Seats and Seals: Replaceable.
 6. Handle: Vinyl-covered steel.
 7. Inlet: Threaded or solder joint.
 8. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.
- 2.7 WATER HAMMER ARRESTERS
- A. Water Hammer Arresters (WHA):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASSE 1010 or PDI-WH 201.
 3. Type: Metal bellows.
 4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
- 2.8 TRAP-SEAL PRIMER VALVES
- A. Supply-Type, Trap-Seal Primer Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB, Inc.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 2. Standard: ASSE 1018.
 3. Pressure Rating: minimum.
 4. Body: Bronze.

5. Inlet and Outlet Connections: threaded, union, or solder joint.
 6. Gravity Drain Outlet Connection: threaded or solder joint.
 7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
- B. Drainage-Type, Trap-Seal Primer Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 2. Standard: ASSE 1044, lavatory P-trap with minimum, trap makeup connection.
 3. Size: minimum.
 4. Material: Chrome-plated, cast brass.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
1. Locate backflow preventers in same room as connected equipment or system.
 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
- B. Do not install bypass piping around backflow preventers.
- C. Install balancing valves in locations where they can easily be adjusted.
- D. Install water hammer arresters in water piping according to PDI-WH 201.
- E. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

3.2 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
1. Pressure vacuum breakers.
 2. Calibrated balancing valves.
 3. Outlet boxes.
 4. Hose stations.
 5. Supply-type, trap-seal primer valves.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 23 Section "Identification for HVAC Piping and Equipment."

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer, double-check backflow-prevention assembly according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.4 ADJUSTING

- A. Set field-adjustable flow set points of balancing valves.

* * *

FACILITY INDOOR POTABLE-WATER STORAGE TANKS

Section 22 12 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel, pressure, potable-water storage tanks.

1.3 DEFINITIONS

- A. HDPE: High-density polyethylene plastic.
- B. LDPE: Low-density polyethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Steel water tanks shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water storage tanks.
 - 2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.6 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For steel water storage tanks, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Product Certificates: For each type of potable-water storage tank, from manufacturer.
- C. Source quality-control reports.
- D. Purging and disinfecting reports.

1.7 QUALITY ASSURANCE

- A. ASME Compliance for Steel Tanks: Fabricate and label steel, ASME-code, potable-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
- B. Comply with NSF 61, "Drinking Water System Components - Health Effects," for potable-water storage tanks. Include appropriate NSF marking.

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 STEEL, PRESSURE, POTABLE-WATER STORAGE TANKS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hanson Tanks.
 - 2. Lochinvar Corporation.
 - 3. Raypak.
- B. Description: Steel, vertical, pressure-rated tank with cylindrical sidewalls.

- C. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
- D. Construction: ASME code, steel, constructed with nontoxic welded joints, for 125-psig (860-kPa) working pressure.
- E. Tappings: Factory-fabricated stainless steel, welded to tank before testing and labeling.
 - 1. NPS 2 (DN 50) and Smaller: ASME B1.20.1, with female thread.
 - 2. NPS 2-1/2 (DN 65) and Larger: ASME B16.5, flanged.
- F. Specialties and Accessories: Include tappings in tank and the following:
 - 1. Pressure relief valve.
 - 2. Pressure gage.
 - 3. Thermometer.
 - 4. Air-charging connection.
 - 5. Gage glass, brass fittings, compression stops, and gage-glass guard.
- G. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank before testing and labeling.
- H. Tank Interior Finish: Materials and thicknesses complying with NSF 61 barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.
 - 1. Lining Material: Glass.
- I. Exterior Coating: Manufacturer's standard enamel paint.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install water storage tanks on concrete bases, level and plumb, firmly anchored. Arrange so devices needing servicing are accessible.
- B. Anchor tank supports and tanks to substrate.
 - 1. Use steel or FRP straps over or around plastic tanks.
- C. Install tank seismic restraints.
- D. Install thermometers and pressure gages on water storage tanks and piping if indicated. Thermometers and pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."
- E. Install the following devices on tanks where indicated:
 - 1. Pressure relief valves.
 - 2. Temperature and pressure relief valves.
 - 3. Vacuum relief valves.
 - 4. Tank vents on nonpressure tanks.
 - 5. Connections to accessories.
- F. After installing tanks with factory finish, inspect finishes and repair damages to finishes.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to potable-water storage tanks to allow service and maintenance.
- C. Connect water piping to water storage tanks with unions or flanges and with shutoff valves. Connect tank drains with shutoff valves and discharge over closest floor drains.
 - 1. General-duty valves are specified in Section 220523 "General-Duty Valves for Plumbing Piping."
 - a. Valves NPS 2 (DN 50) and Smaller: Gate or ball.
 - b. Valves NPS 2-1/2 (DN 65) and Larger: Gate or butterfly.
 - c. Drain Valves: NPS 3/4 (DN 20) gate or ball valve. Include outlet with, or nipple in outlet with, ASME B1.20.7, 3/4-11.5NH thread for garden-hose service, threaded cap, and chain.
 - 2. Water Piping Connections: Make connections to dissimilar metals with dielectric fittings. Dielectric fittings are specified in Section 221116 "Domestic Water Piping."
 - 3. Connect air piping to hydropneumatic tanks with unions or flanges and gate or ball valves. Make connections to dissimilar metals with dielectric fittings, which are specified in Section 221513 "General-Service Compressed-Air Piping."

3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- B. Perform the following final checks before filling:
1. Verify that air precharge in precharged tanks is correct.
 2. Test operation of tank accessories and devices.
 3. Verify that pressure relief valves have correct setting.
 - a. Manually operate pressure relief valves.
 - b. Adjust pressure settings.
 4. Verify that vacuum relief valves are correct size.
 - a. Manually operate vacuum relief valves.
 - b. Adjust vacuum settings.
- C. Filling Procedures: Follow manufacturer's written procedures. Fill tanks with water to operating level.

3.5 CLEANING

- A. Clean and disinfect potable-water storage tanks.
- B. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, use procedure described in AWWA C652 or as described below:
1. Purge water storage tanks with potable water.
 2. Disinfect tanks by one of the following methods:
 - a. Fill tanks with water-chlorine solution containing at least 50 ppm (50 mg/L) of chlorine. Isolate tanks and allow to stand for 24 hours.
 - b. Fill tanks with water-chlorine solution containing at least 200 ppm (200 mg/L) of chlorine. Isolate tanks and allow to stand for three hours.
 3. Flush tanks, after required standing time, with clean, potable water until chlorine is not present in water coming from tank.
 4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination made by authorities having jurisdiction shows evidence of contamination.
- C. Prepare written reports for purging and disinfecting activities.

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SANITARY WASTE AND VENT PIPING

Section 22 13 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:

- 1. Pipe, tube, and fittings.
- 2. Special pipe fittings.
- 3. Encasement for underground metal piping.

- B. Related Sections include the following:

- 1. Division 01 Sustainable Design Requirements – LEED Sections.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

- 1. Soil, Waste, and Vent Piping: 10-Foot Head of Water.

- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.4 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.

- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.

- C. Shop Drawings:

- 1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.

- D. Field quality-control inspection and test reports.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.

- B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

- 1. Heavy Duty, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; 4 stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.

- a. Manufacturers:

- 1) Husky.

2.4 PE ENCASEMENT FOR UNDERGROUND METAL PIPING

- A. Description: ASTM A 674 or AWWA C105, metal piping, cross-laminated PE film of 0.008-inch minimum thickness.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range.
1. NPS 1-1/4 and NPS 1-1/2: Use NPS 1-1/2 hubless, cast-iron soil piping and one of the following:
 - a.
 - b. Couplings: Heavy-duty, Type 301, stainless steel.
 2. NPS 1-1/2 to NPS 4: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 301, stainless steel.
 3. NPS 5 and Larger: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 301, stainless steel.
- C. Underground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:
1. NPS 1-1/2: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 301, stainless steel.
 2. NPS 2 to NPS 4: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 301, stainless steel.
 3. NPS 5 and Larger: Hubless, cast-iron soil piping and one of the following:
 - a. Couplings: Heavy-duty, Type 301, stainless steel.

3.3 PIPING INSTALLATION

- A. Sanitary sewer piping outside the building is specified in Division 02 Sections.
- B. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.
- E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 23 Section "Basic Mechanical Materials and Methods."
- F. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.
- G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- J. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping and smaller; 1 percent downward in direction of flow for piping and larger.
 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- K. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- L. Install underground soil and waste drainage piping according to ASTM D 2321.
- M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- 3.4 JOINT CONSTRUCTION
- A. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- 3.5 VALVE INSTALLATION
- A. General valve installation requirements are specified in Division 23 Section "General-Duty Valves for HVAC Piping and Equipment."
- B. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
1. Install gate or full-port ball valve for piping and smaller.
 2. Install gate valve for piping and larger.
- C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.
- 3.6 HANGER AND SUPPORT INSTALLATION
- A. Seismic-restraint devices are specified in Division 23 Section "Vibration and Seismic Controls and Seismic Restraints for HVAC Piping and Equipment."
- B. Pipe hangers and supports are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Install the following:
1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 2. Install individual, straight, horizontal piping runs according to the following:
 - a. and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than: MSS Type 43, adjustable roller hangers.
 - c. Longer Than, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: Go inches with 3/8-inch rod.
 2. NPS 3: Go inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: Go inches with 5/8-inch rod.
 4. NPS 6: Go inches with 3/4-inch rod.
 5. NPS 8: Go inches with 3/4-inch rod.
- G. Install supports for vertical cast-iron soil piping every.
- 3.7 CONNECTIONS
- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections and larger.

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 6. Contractor to pressure jet storm drains and sewers at the end of construction, prior to occupancy to insure that they are free of any construction debris, then contractor shall video tape sewers and storm drains to verify alignment, full and drainage. Video tape must show a wet run water test with inspector present.
 7. Prepare reports for tests and required corrective action.
- E. Contractor shall provide services to video the condition of all new underground sanitary sewer pipe installation at two separate time periods during construction with representatives of the university present. Coordinate scheduling with the university.

3.9 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PROTECTION

- A. Exposed Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

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SANITARY WASTE PIPING SPECIALTIES Section 22 13 19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following drainage piping specialties:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Through-penetration firestop assemblies.
5. Roof drains.
6. Miscellaneous drainage piping specialties.
7. Flashing materials.
8. Sand-Oil interceptors.

1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.
 1. Wiring Diagrams: Power, signal, and control wiring.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary and storm piping specialty components.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Metal Floor Cleanouts (FCO):
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Light Commercial Operation.
 2. Standard: ASME A112.36.2M for threaded, adjustable housing cleanout.
 3. Size: Same as connected branch.
 4. Type: Threaded, adjustable housing.
 5. Body or Ferrule: Cast iron.
 6. Clamping Device: Required.
 7. Outlet Connection: Threaded.
 8. Closure: Brass plug with straight threads and gasket.
 9. Adjustable Housing Material: Cast iron with threads.
 10. Frame and Cover Material and Finish: Polished bronze.

11. Frame and Cover Shape: Round.
12. Top Loading Classification: Heavy Duty.
13. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
14. Standard: ASME A112.3.1.
15. Size: Same as connected branch.
16. Housing: Stainless steel.
17. Closure: Stainless steel with seal.
18. Riser: Stainless-steel drainage pipe fitting to cleanout.

B. Cast-Iron Wall Cleanouts (WCO):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Drilled-and-threaded plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
8. Wall Access: Round wall-installation frame and cover.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains (FD-1):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Light Commercial Operation.
2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Seepage Flange: Required.
6. Anchor Flange: Required.
7. Clamping Device: Required.
8. Outlet: Bottom.
9. Backwater Valve: Drain-outlet type.
10. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
11. Sediment Bucket: Not required.
12. Top or Strainer Material: Nickel bronze.
13. Top of Body and Strainer Finish: Nickel bronze.
14. Top Shape: Round.
15. Dimensions of Top or Strainer: 5" Diameter Strainer.
16. Top Loading Classification: Heavy Duty.
17. Funnel: Not required.
18. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
19. Trap Material: Cast iron.
20. Trap Pattern: Standard P-trap.
21. Trap Features: Trap-seal primer valve drain connection.

2.3 TRENCH DRAINS

A. Trench Drains TD-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn Plumbing Products Group; Specification Drainage Operation.
 - b. Or approved equal.

2. Standard: ASME A112.6.3 for trench drains.
 3. Material: Ductile or gray iron.
 4. Flange: Seepage.
 5. Clamping Device: Required.
 6. Outlet: Bottom.
 7. Grate Material: Ductile iron.
 8. Grate Finish: Not required.
 9. Dimensions of Frame and Grate: **<Insert dimensions and describe body, sump, and grate if required.>**
 10. Top Loading Classification: Extra Heavy-Duty.
 11. Trap Material: Not required.
 12. Trap Pattern: Not required.
- 2.4 ROOF DRAINS
- A. Metal Roof Drains (RD-1):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASME A112.21.2M.
 3. Pattern: Roof drain.
 4. Body Material: Cast iron.
 5. Dimensions of Body:
 6. Combination Flashing Ring and Gravel Stop: Required.
 7. Flow-Control Weirs: Not required.
 8. Outlet: Bottom.
 9. Dome Material: Cast iron.
 10. Extension Collars: Not required.
 11. Underdeck Clamp: Required.
 12. Sump Receiver: Required.
- 2.5 OVERFLOW ROOF DRAINS
- A. Roof drains, (ORD-1): Comply with ASME A112.21.2M ASME A112.3.1.
1. Application: Overflow roof drain.
 2. Products:
 - a. Smith, Jay R. Mfg. Co.; Fig. 1080.
 - b. Josam Co.; Model No. 21500.
 - c. Zurn Industries, Inc., Jonespec Div., Model No. Z-100-89.
 3. Body Material: Cast iron.
 4. Combination Flashing Ring and Gravel Stop: Required.
 5. Outlet: Bottom.
 6. Dome Material: Cast iron.
 7. Extension Collars: Required.
 8. Underdeck Clamp: Required.
 9. Sump Receiver: Required.
- 2.6 MISCELLANEOUS DRAINAGE PIPING SPECIALTIES
- A. Open Drains:
1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
 2. Size: Same as connected waste piping with increaser fitting of size indicated.
- B. Deep-Seal Traps:
1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.

2. Size: Same as connected waste piping.
 - a. 2-inch minimum water seal.
 - C. Floor-Drain, Trap-Seal Primer Fittings:
 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 2. Size: Same as floor drain outlet with side inlet.
 - D. Sleeve Flashing Device:
 1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
 2. Size: As required for close fit to riser or stack piping.
 - E. Vent Caps:
 1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
 2. Size: Same as connected stack vent or vent stack.
 - F. Downspout Boots:
 1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; outlet; and shop-applied bituminous coating.
 2. Size: Inlet size to match downspout.
 3. Description: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe.
 4. Size: Same as or larger than connected downspout.
 - G. Conductor Nozzles:
 1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
 2. Size: Same as connected conductor.
- 2.7 FLASHING MATERIALS
- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 1. General Use: , thickness.
 2. Vent Pipe Flashing: , thickness.
 3. Burning: , thickness.
 - B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:
 1. General Applications:
 2. Vent Pipe Flashing:
 - C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and minimum thickness, unless otherwise indicated. Include hot-dip galvanized, mill-phosphatized finish for painting if indicated.
 - D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, minimum thickness.
 - E. Fasteners: Metal compatible with material and substrate being fastened.
 - F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
 - G. Solder: ASTM B 32, lead-free alloy.
 - H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.
- 2.8 SAND OIL INTERCEPTORS
- A. Sand Oil Interceptors SOI-1:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jensen Precast.
 - b. Or approved equal.
 2. Type: Factory-fabricated interceptor for separating and removing sand and oil from wastewater.
 3. Body Material: Concrete.
 4. Interior Lining: Corrosion-resistant enamel.

5. Exterior Coating: Not required.
6. Body Dimensions: 11ft 6 inches by 6 ft 0 inches by 5 ft 7 inches high.
7. Inlet and Outlet Size: 6-inch.
8. End Connections: Hub.
9. Mounting: Above floor.
10. Flow-Control Fitting: Not required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to. Use for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of for piping and smaller and for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 1. Position floor drains for easy access and maintenance.
 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, or Less: Equivalent to 1 percent slope, but not less than total depression.
 - b. Radius,: Equivalent to 1 percent slope.
 - c. Radius, or Larger: Equivalent to 1 percent slope, but not greater than total depression.
 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- E. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.
- F. Install roof-flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Install through-penetration firestop assemblies in all conductors and stacks at floor penetrations.
- I. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Roofing materials are specified in Division 07.
 1. Install roof-drain flashing collar or flange so that there will be no leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 2. Position roof drains for easy access and maintenance.
- J. Assemble open drain fittings and install with top of hub 18 inches (minimum) above floor.
- K. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- L. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 2. Size: Same as floor drain inlet.
- M. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- N. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- O. Install vent caps on each vent pipe passing through roof.

- P. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain clearance between vent pipe and roof substrate.
 - Q. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.
 - R. Install cast-iron soil pipe downspout boots at grade with top of hub 6" above grade.
 - S. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.
 - T. Install frost-proof vent caps on each vent pipe passing through roof. Maintain clearance between vent pipe and roof substrate.
 - U. Install wood-blocking reinforcement for wall-mounting-type specialties.
 - V. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
 - W. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipefittings.
- 3.2 CONNECTIONS
- A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Install piping adjacent to equipment to allow service and maintenance.
- 3.3 FLASHING INSTALLATION
- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets, thickness or thicker. Solder joints of lead sheets, thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
 - B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of, and skirt or flange extending at least around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least around specialty.
 - C. Set flashing on floors and roofs in solid coating of bituminous cement.
 - D. Secure flashing into sleeve and specialty clamping ring or device.
 - E. Install flashing for piping passing through roofs with counter-flashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
 - F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
 - G. Fabricate and install flashing and pans, sumps, and other drainage shapes.
- 3.4 FIELD QUALITY CONTROL
- A. Perform tests and inspections and prepare test reports.
 - B. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- 3.5 PROTECTION
- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
 - B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

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FACILITY STORM DRAINAGE PIPING

Section 22 14 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following storm drainage piping inside the building:

1. Pipe, tube, and fittings.
2. Special pipefittings.
3. Encasement for underground metal piping.

- B. Related Sections include the following:

1. Division 01 Sustainable Design Requirements – LEED Sections.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:

1. Storm Drainage Piping: 10 foot head of water.

1.4 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings:
 1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.
 2. Controlled-Flow Storm Drainage System: Include calculations, plans, and details.
- D. Field quality-control inspection and test reports.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral center pipe stop.
 1. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.
 - a. NPS 1-1/2 to NPS 4: 3-inch- wide shield with 4 bands.
 - b. NPS 5 to NPS 10: 4-inch- wide shield with 6 bands.

2.4 ENCASEMENT FOR UNDERGROUND METAL PIPING

- A. Description: ASTM A 674 or AWWA C105, PE film of 0.008-inch minimum thickness.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground storm drainage piping NPS 2 to NPS 8 shall be the following:
 1. Hubless cast-iron soil pipe and fittings; heavy duty, shielded, stainless-steel couplings; and coupled joints.

- C. Underground storm drainage piping NPS 2 to NPS 8 shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; heavy duty, shielded, stainless-steel couplings; and coupled joints.
- 3.2 PIPING INSTALLATION
 - A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.
 - B. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
 - C. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers. Cleanouts are specified in Division 22 Section "Sanitary Waste Piping Specialties."
 - D. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
 - E. Install wall-penetration fitting system at each service pipe penetration through foundation wall. Make installation watertight.
 - F. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
 - G. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
 - H. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
 - I. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Storm Drain: 2 percent downward in direction of flow.
 - 2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.
 - J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
 - K. Install underground storm drainage piping according to ASTM D 2321.
 - L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- 3.3 JOINT CONSTRUCTION
 - A. Hubless Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- 3.4 VALVE INSTALLATION
 - A. General valve installation requirements are specified in Division 23 Section 220523 "General-Duty Valves for Plumbing Piping."
 - B. Shutoff Valves: Install shutoff valve on each sump pump discharge.
 - 1. Install gate or full-port ball valve for piping and smaller.
 - 2. Install gate valve for piping and larger.
 - C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sump pump discharge.
- 3.5 HANGER AND SUPPORT INSTALLATION
 - A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
 - B. Pipe hangers and supports are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. (x)and Less: MSS Type 1, adjustable, steel clevis hangers.

- b. Longer Than (x): MSS Type 43, adjustable roller hangers.
- 3. Multiple, Straight, Horizontal Piping Runs or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
- 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Install supports according to Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3: 60 inches with 1/2-inch rod.
 - 2. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 3. NPS 6: 60 inches with 3/4-inch rod.
 - 4. Spacing for 10 foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- 3.6 CONNECTIONS
 - A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
 - C. Connect storm drainage piping to roof drains and storm drainage specialties.
- 3.7 FIELD QUALITY CONTROL
 - A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Test Procedure: Test storm drainage piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.
 - 6. Contractor to pressure jet storm drains and sewers at the end of construction, prior to occupancy to insure that they are free of any construction debris, then contractor shall video tape sewers and storm drains to verify alignment, full and drainage. Video tape must show a wet run water test with inspector present.
- 3.8 CLEANING
 - A. Clean interior of piping. Remove dirt and debris as work progresses.
 - B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

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GENERAL-SERVICE COMPRESSED AIR PIPING

Section 22 15 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes piping and related specialties for general-service compressed-air systems operating at 200 psig (1380 kPa) or less.
- B. Related Sections include the following:
 - 1. Section 22 15 19 "General-Service Packaged Air Compressors and Receivers" for general-service air compressors and accessories.

1.3 DEFINITIONS

- A. High-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures between 150 and 200 psig (1035 and 1380 kPa).
- B. Low-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures of 150 psig (1035 kPa) or less.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Compressed-air piping and support and installation shall withstand effects of seismic events determined according to SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Plastic pipes, fittings, and valves.
 - 2. Dielectric fittings.
 - 3. Flexible pipe connectors.
 - 4. Safety valves.
 - 5. Pressure regulators. Include rated capacities and operating characteristics.
 - 6. Automatic drain valves.
 - 7. Filters. Include rated capacities and operating characteristics.
 - 8. Lubricators. Include rated capacities and operating characteristics.
 - 9. Quick couplings.
 - 10. Hose assemblies.

1.6 INFORMATIONAL SUBMITTALS

- A. Brazing and welding certificates.
- B. Qualification Data: For Installers.
- C. Field quality-control test reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For general-service compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Extruded-Tee Outlet Procedure: Qualify operators according to training provided by T-DRILL Industries Inc., for making branch outlets.
 - 2. Pressure-Seal Joining Procedure for Copper Tubing: Qualify operators according to training provided by Viega; Plumbing and Heating Systems.
 - 3. Pressure-Seal Joining Procedure for Steel Piping. Qualify operators according to training provided by Victaulic Company.
- B. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or to AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
- C. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

- D. ASME Compliance:
1. Comply with ASME B31.1, "Power Piping," for high-pressure compressed-air piping.
 2. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Schedule 40, Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B, black or hot-dip zinc coated with ends threaded according to ASME B1.20.1.
1. Steel Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.
 2. Malleable-Iron Fittings: ASME B16.3, Class 150 or 300, threaded.
 3. Malleable-Iron Unions: ASME B16.39, Class 150 or 300, threaded.
 4. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel, threaded.
 5. Wrought-Steel Butt-Welding Fittings: ASME B16.9, Schedule 40.
 6. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel.
 7. Grooved-End Fittings and Couplings:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Anvil International, Inc.
 - 2) Star Pipe Products; Star Fittings Div.
 - 3) Victaulic Company.
 - 4) Ward Manufacturing, Inc.
 - b. Grooved-End Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron casting; with grooves according to AWWA C606 and dimensions matching steel pipe.
 - c. Couplings: AWWA C606 or UL 213, for steel-pipe dimensions and rated for 300-psig (2070-kPa) minimum working pressure. Include ferrous housing sections, gasket suitable for compressed air, and bolts and nuts. Provide EDPM gaskets for oil-free compressed air. Provide NBR gaskets if compressed air contains oil or oil vapor.
- B. Copper Tube: ASTM B 88, Type K or L (ASTM B 88M, Type A or B) seamless, drawn-temper, water tube.
1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.
 2. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150 or 300.
 3. Copper Unions: ASME B16.22 or MSS SP-123.

2.2 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for compressed-air piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

2.3 VALVES

- A. Metal Ball, Butterfly, Check, Gate, and Globe Valves: Comply with requirements in Section 220523 "General-Duty Valves for Plumbing Piping."

2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

- B. Dielectric Unions:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McDonald, A. Y. Mfg. Co.
 - b. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - c. Wilkins; a Zurn company.
 2. Description:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: 150 psig (1035 kPa).
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.
- 2.5 SPECIALTIES
- A. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet-type safety valve for compressed-air service.
 1. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.
 - B. Air-Main Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 250-psig (1725-kPa) inlet pressure, unless otherwise indicated.
 1. Type: Pilot operated.
 - C. Air-Line Pressure Regulators: Diaphragm or pilot operated, bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 200-psig (1380-kPa) minimum inlet pressure, unless otherwise indicated.
 - D. Automatic Drain Valves: Stainless-steel body and internal parts, rated for 200-psig (1380-kPa) minimum working pressure, capable of automatic discharge of collected condensate. Include mounting bracket if wall mounting is indicated.
 - E. Coalescing Filters: Coalescing type with activated carbon capable of removing water and oil aerosols; with color-change dye to indicate when carbon is saturated and warning light to indicate when selected maximum pressure drop has been exceeded. Include mounting bracket if wall mounting is indicated.
 - F. Air-Line Lubricators: With drip chamber and sight dome for observing oil drop entering air stream; with oil-feed adjustment screw and quick-release collar for easy bowl removal. Include mounting bracket if wall mounting is indicated.
 1. Provide with automatic feed device for supplying oil to lubricator.
- 2.6 QUICK COUPLINGS
- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Aeroquip Corporation; Eaton Corp.
 2. Or approved equal.
 - C. General Requirements for Quick Couplings: Assembly with locking-mechanism feature for quick connection and disconnection of compressed-air hose.
 - D. Automatic-Shutoff Quick Couplings: Straight-through brass body with O-ring or gasket seal and stainless-steel or nickel-plated-steel operating parts.
 1. Plug End: Straight-through type with barbed outlet for attaching hose.
 - E. Valveless Quick Couplings: Straight-through brass body with stainless-steel or nickel-plated-steel operating parts.
 1. Socket End: With O-ring or gasket seal, without valve, and with barbed inlet for attaching hose.
 2. Plug End: With barbed outlet for attaching hose.
- 2.7 HOSE ASSEMBLIES
- A. Description: Compatible hose, clamps, couplings, and splicers suitable for compressed-air service, of nominal diameter indicated, and rated for 300-psig (2070-kPa) minimum working pressure, unless otherwise indicated.

1. Hose: Reinforced double-wire-braid, CR-covered hose for compressed-air service.
2. Hose Clamps: Stainless-steel clamps or bands.
3. Hose Couplings: Two-piece, straight-through, threaded brass or stainless-steel O-ring or gasket-seal swivel coupling with barbed ends for connecting two sections of hose.
4. Hose Splicers: One-piece, straight-through brass or stainless-steel fitting with barbed ends for connecting two sections of hose.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Compressed-Air Piping between Air Compressors and Receivers: Use one of the following piping materials for each size range:
 1. NPS 2 (DN 50) and Smaller: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.
- B. Low-Pressure Compressed-Air Distribution Piping: Use one of the following piping materials for each size range:
 1. NPS 2 (DN 50) and Smaller: Schedule 40, black-steel pipe; threaded, malleable-iron fittings; and threaded joints.
 2. NPS 2 (DN 50) and Smaller: Type K or L (Type A or B), copper tube; wrought-copper fittings; and brazed or soldered joints.
- C. High-Pressure Compressed-Air Distribution Piping: Use one of the following piping materials for each size range:
 1. NPS 2 (DN 50) and Smaller: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.

3.2 VALVE APPLICATIONS

- A. General-Duty Valves: Comply with requirements in Section 220523 "General-Duty Valves for Plumbing Piping" for metal general-duty valves. Use metal valves, unless otherwise indicated.
 1. Metal General-Duty Valves: Use valve types specified in "Valve Applications" Article in Section 220523 "General-Duty Valves for Plumbing Piping" according to the following:
 - a. Low-Pressure Compressed Air: Valve types specified for low-pressure compressed air.
 - b. High-Pressure Compressed Air: Valve types specified for medium-pressure compressed air.
 - c. Equipment Isolation NPS 2 (DN 50) and Smaller: Safety-exhaust, copper-alloy ball valve with exhaust vent and pressure rating at least as great as piping system operating pressure.
 - d. Grooved-end valves may be used with grooved-end piping and grooved joints.

3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping concealed from view and protected from physical contact by building occupants, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and to coordinate with other services occupying that space.
- E. Install piping adjacent to equipment and machines to allow service and maintenance.
- F. Install air and drain piping with 1 percent slope downward in direction of flow.
- G. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating, unless otherwise indicated.
- H. Equipment and Specialty Flanged Connections:
 1. Use steel companion flange with gasket for connection to steel pipe.

2. Use cast-copper-alloy companion flange with gasket and brazed or soldered joint for connection to copper tube. Do not use soldered joints for connection to air compressors or to equipment or machines producing shock or vibration.
 - I. Install eccentric reducers where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
 - J. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.
 - K. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Section 220519 "Meters and Gages for Plumbing Piping."
 - L. Install piping to permit valve servicing.
 - M. Install piping free of sags and bends.
 - N. Install fittings for changes in direction and branch connections.
 - O. Install seismic restraints on piping. Seismic-restraint devices are specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
 - P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
 - Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
 - R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."
- 3.4 JOINT CONSTRUCTION
 - A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - D. Welded Joints for Steel Piping: Join according to AWS D10.12/D10.12M.
 - E. Brazed Joints for Copper Tubing: Join according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
 - F. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Join according to ASTM B 828 or CDA's "Copper Tube Handbook."
 - G. Dissimilar Metal Piping Material Joints: Use dielectric fittings.
- 3.5 VALVE INSTALLATION
 - A. General-Duty Valves: Comply with requirements in Section 220523 "General-Duty Valves for Plumbing Piping."
 - B. Install shutoff valves and unions or flanged joints at compressed-air piping to air compressors.
 - C. Install shutoff valve at inlet to each automatic drain valve, filter, lubricator, and pressure regulator.
 - D. Install check valves to maintain correct direction of compressed-air flow to and from compressed-air piping specialties and equipment.
- 3.6 DIELECTRIC FITTING INSTALLATION
 - A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - B. NPS 2 (DN 50) and Smaller: Use dielectric unions.
 - C. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.
- 3.7 SPECIALTY INSTALLATION
 - A. Install safety valves on receivers in quantity and size to relieve at least the capacity of connected air compressors.
 - B. Install air-main pressure regulators in compressed-air piping at or near air compressors.

- C. Install air-line pressure regulators in branch piping to equipment and tools.
 - D. Install automatic drain valves on aftercoolers, receivers, and dryers. Discharge condensate onto nearest floor drain.
 - E. Install coalescing filters in compressed-air piping at or near air compressors and upstream from mechanical filters. Mount on wall at locations indicated.
 - F. Install air-line lubricators in branch piping to machine tools. Mount on wall at locations indicated.
 - G. Install quick couplings at piping terminals for hose connections.
 - H. Install hose assemblies at hose connections.
- 3.8 CONNECTIONS
- A. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment and machine.
 - B. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment and machine.
- 3.9 HANGER AND SUPPORT INSTALLATION
- A. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.
 - B. Vertical Piping: MSS Type 8 or 42, clamps.
 - C. Individual, Straight, Horizontal Piping Runs:
 - 1. 100 Feet (30 m) or Less: MSS Type 1, adjustable, steel clevis hangers.
 - 2. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
 - D. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - E. Base of Vertical Piping: MSS Type 52, spring hangers.
 - F. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.
 - G. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.
 - H. Install hangers for Schedule 40, steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1/4 to NPS 1/2 (DN 8 to DN 15): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
 - 2. NPS 3/4 to NPS 1-1/4 (DN 20 to DN 32): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
 - 3. NPS 1-1/2 (DN 40): 12 feet (3.7 m) with 3/8-inch (10-mm) rod.
 - 4. NPS 2 (DN 50): 13 feet (4 m) with 3/8-inch (10-mm) rod.
 - 5. NPS 2-1/2 (DN 65): 14 feet (4.3 m) with 1/2-inch (13-mm) rod.
 - I. Install supports for vertical, Schedule 40, steel piping every 15 feet (4.6 m).
 - J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1/4 (DN 8): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 - 2. NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
 - 3. NPS 3/4 (DN 20): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
 - 4. NPS 1 (DN 25): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
 - 5. NPS 1-1/4 (DN 32): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
 - 6. NPS 1-1/2 (DN 40): 10 feet (3 m) with 3/8-inch (10-mm) rod.
 - 7. NPS 2 (DN 50): 11 feet (3.4 m) with 3/8-inch (10-mm) rod.
 - 8. NPS 2-1/2 (DN 65): 13 feet (4 m) with 1/2-inch (13-mm) rod.
 - K. Install supports for vertical copper tubing every 10 feet (3 m).
- 3.10 LABELING AND IDENTIFICATION
- A. Install identifying labels and devices for general-service compressed-air piping, valves, and specialties. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment."
- 3.11 FIELD QUALITY CONTROL
- A. Perform field tests and inspections.

- B. Tests and Inspections:
 - 1. Piping Leak Tests for Metal Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 50 psig (345 kPa) above system operating pressure, but not less than 150 psig (1035 kPa). Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - 2. Repair leaks and retest until no leaks exist.
 - 3. Inspect filters lubricators and pressure regulators for proper operation.
- C. Prepare test reports.

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GENERAL SERVICE PACKAGED AIR COMPRESSORS AND RECEIVERS Section 22 15 19

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 1. Oilless, reciprocating air compressors.
 2. Inlet-air filters.
 3. Air-cooled, compressed-air aftercoolers.
 4. Water-cooled, compressed-air aftercoolers.
 5. Refrigerant compressed-air dryers.

1.3 DEFINITIONS

- A. Actual Air: Air delivered from air compressors. Flow rate is delivered compressed air measured in acfm (actual L/s).
- B. Standard Air: Free air at 68 deg F (20 deg C) and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in scfm (standard L/s).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
 1. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For compressed-air equipment mounting.
 1. Detail fabrication and assembly of supports.
 2. Include design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

1.5 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For compressed-air equipment, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For compressed-air equipment to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Air-Compressor, Inlet-Air-Filter Elements: Equal to 10 percent of amount installed, but no fewer than 5 units.
 2. Belts: One for each belt-driven compressor.

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.
- 2.2 PERFORMANCE REQUIREMENTS
- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design compressed-air equipment mounting.
 - B. Seismic Performance: Compressed-air equipment shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
- 2.3 GENERAL REQUIREMENTS FOR PACKAGED AIR COMPRESSORS AND RECEIVERS
- A. General Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty air compressors and receivers that deliver air of quality equal to intake air.
 - B. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.
 - 1. Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.
 - 2. Motor Controllers: Full-voltage, combination magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.
 - 3. Control Voltage: 120-V ac or less, using integral control power transformer.
 - 4. Motor Overload Protection: Overload relay in each phase.
 - 5. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
 - 6. Automatic control switches to alternate lead-lag compressors for duplex air compressors.
 - 7. Instrumentation: Include discharge-air pressure gage, air-filter maintenance indicator, hour meter, compressor discharge-air and coolant temperature gages, and control transformer.
 - 8. Alarm Signal Device: For connection to alarm system to indicate when backup air compressor is operating.
 - C. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 1. Pressure Rating: At least as high as highest discharge pressure of connected compressors, and bearing appropriate code symbols.
 - 2. Interior Finish: Corrosion-resistant coating.
 - 3. Accessories: Include safety valve, pressure gage, drain, and pressure-reducing valve.
 - D. Mounting Frame: Fabricate mounting and attachment to pressure vessel with reinforcement strong enough to resist packaged equipment movement during a seismic event when base is anchored to building structure.
- 2.4 OILLESS, RECIPROCATING AIR COMPRESSORS
- A. Manufacturers: Subject to compliance with requirements, provide products by the following provide products by one of the following:
 - 1. Ingersoll-Rand Company; Compressed Air Solutions.
 - 2. Kaeser Compressors, Inc.
 - 3. Powerex, Inc.
 - 4. Quincy Compressor.
 - B. Compressor(s): Oilless (nonlubricated), reciprocating-piston type, with sealed oil-free bearings, that deliver air of quality equal to intake air.
 - 1. High discharge-air temperature switch.
 - 2. Belt guard totally enclosing pulleys and belts.
 - C. Capacities and Characteristics:
 - 1. Air Compressor(s): Two; two stage.
 - a. Intercooler between stages of two-stage units.
 - 2. Standard-Air Capacity of Each Air Compressor: 13 scfm free air.
 - 3. Actual-Air Capacity of Each Air Compressor: 16.8 acfm delivered.
 - 4. Discharge-Air Pressure: 150 psig.

5. Intake-Air Temperature: 25 deg F above ambient.
 6. Discharge-Air Temperature: less than 100 deg F.
 7. Mounting: Tank mounted.
 8. Motor (Each Air Compressor):
 - a. Horsepower: 5.
 - b. Speed: 1040 rpm.
 9. Electrical Characteristics:
 - a. Volts: 230.
 - b. Phase(s): Three.
 - c. Full-Load Amperes: 15.2.
 10. Receiver: ASME construction steel tank.
 - a. Arrangement: Vertical.
 - b. Capacity: 80 gal.
 - c. Interior Finish: Epoxy or galvanized coating.
 - d. Pressure Rating: 175 psig minimum.
 - e. Pressure Regulator Setting: 150 psig.
 - f. Pressure Relief Valve Setting: 160 psig.
 - g. Drain: Automatic valve.
- 2.5 INLET-AIR FILTERS
- A. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.
 1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
 2. Capacity: Match capacity of air compressor, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.
- 2.6 REFRIGERANT COMPRESSED-AIR DRYERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Air/Tak, Inc.
 2. Ingersoll-Rand Company; Compressed Air Solutions.
 3. Kaeser Compressors, Inc.
 4. Zeks Compressed Air Solutions.
 - B. Description: Noncycling, air-cooled, electric-motor-driven unit with steel enclosure and capability to deliver 35 deg F (2 deg C), 100-psig (690-kPa) air at dew point. Include automatic ejection of condensate from airstream, step-down transformers, disconnect switches, inlet and outlet pressure gages, thermometers, automatic controls, and filters.
 - C. Capacities and Characteristics:
 1. Standard-Air Capacity of Each Compressed-Air Dryer: 15 scfm free air.
 2. Pressure: 150 (kPa).
 3. Entering-Air Temperature: 115 deg F.
 4. Leaving-Air Temperature: 35 deg F.
 5. Ambient-Air Temperature: 115 deg F.
 6. Maximum Air-Pressure Drop: 5 psig.
 7. Motor Horsepower: 0.16 kw.
 8. Electrical Characteristics:
 - a. Volts: 115.
 - b. Phase(s): Single.
 - c. Hertz: 60.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Equipment Mounting: Install air compressors and air dryers, on concrete bases using elastomeric pads. Comply with requirements in Section 033000 "Cast-in-Place Concrete." Comply with requirements for vibration isolation devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

1. Minimum Deflection: 1/4 inch (6 mm).
 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
- 3.2 CONNECTIONS
- A. Comply with requirements for piping specified in Section 221513 "General-Service Compressed-Air Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Where installing piping adjacent to machine, allow space for service and maintenance.
- 3.3 IDENTIFICATION
- A. Identify general-service air compressors and components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
- 3.4 STARTUP SERVICE
- A. Engage a factory-authorized service representative to startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.
 2. Check for lubricating oil in lubricated-type equipment.
 3. Check belt drives for proper tension.
 4. Verify that air-compressor inlet filters and piping are clear.
 5. Check for equipment vibration-control supports and flexible pipe connectors, and verify that equipment is properly attached to substrate.
 6. Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure, but not higher than rating of system components.
 7. Check for proper seismic restraints.
 8. Drain receiver tanks.
 9. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 10. Test and adjust controls and safeties.
- 3.5 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air compressors and air dryers.

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ELECTRIC, DOMESTIC WATER HEATERS Section 22 33 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Flow-control, electric, tankless, domestic-water heaters.
 - 2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
 - 1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."
- C. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For commercial domestic-water heaters, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Product Certificates: For each type of tankless, electric, domestic-water heater, from manufacturer.
- C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

- 1.8 COORDINATION
 - A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- 1.9 WARRANTY
 - A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Electric, Tankless, Domestic-Water Heaters: One year.

PART 2 - PRODUCTS

- 2.1 ELECTRIC, TANKLESS, DOMESTIC WATER HEATERS
 - A. Flow-Control, Electric, Tankless, Domestic-Water Heaters: EWH-1
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Chromomite Laboratories, Inc. Model M-20L.
 - b. Or approved equal.
 - 2. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.
 - 3. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - a. Connections: ASME B1.20.1 pipe thread.
 - b. Pressure Rating: 150 psig (1035 kPa).
 - c. Heating Element: Resistance heating system.
 - d. Temperature Control: Flow-control fitting.
 - e. Safety Control: High-temperature-limit cutoff device or system.
 - f. Jacket: Aluminum or steel with enameled finish or plastic.
 - 4. Support: Bracket for wall mounting.
 - 5. Capacity and Characteristics:
 - a. Flow Rate: 0.5gpm.
 - b. Maximum Temperature Setting: 110 degrees F.
 - c. Power Demand: 4160 KW.
 - d. Electrical Characteristics:
 - 1) Volts: 208.
 - 2) Phases: Single.
 - 3) Hertz: 60.
- 2.2 SOURCE QUALITY CONTROL
 - A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
 - B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
 - C. Prepare test and inspection reports.

PART 3 - EXECUTION

- 3.1 DOMESTIC-WATER HEATER INSTALLATION
 - A. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters at least 18 inches (457 mm) above floor on wall bracket.
 - 1. Maintain manufacturer's recommended clearances.
 - 2. Arrange units so controls and devices that require servicing are accessible.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 5. Anchor domestic-water heaters to substrate.

- B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
 - C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- 3.2 CONNECTIONS
- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.
- 3.3 IDENTIFICATION
- A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."
- 3.4 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
 - C. Prepare test and inspection reports.
- 3.5 DEMONSTRATION
- A. Train Owner's maintenance personnel to adjust, operate, and maintain tankless, electric, domestic-water heaters.

* * *

FUEL-FIRED DOMESTIC WATER HEATERS Section 22 34 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, grid-type, finned-tube, gas-fired, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

- B. LEED Submittals:

1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."

- C. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For fuel-fired, domestic-water heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- B. Product Certificates: For each type of commercial, gas-fired, domestic-water heater, from manufacturer.

- C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

- D. Source quality-control reports.

- E. Field quality-control reports.

- F. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

- C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."
- 1.8 COORDINATION
- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- 1.9 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 2. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Finned-Tube, Gas-Fired, Domestic-Water Heaters:
 - 1) Heat Exchanger: Five years.
 - 2) Controls and Other Components: Two year(s).
 - 3) Separate Hot-Water Storage Tanks: Five years.

PART 2 - PRODUCTS

- 2.1 COMMERCIAL, FINNED-TUBE, GAS-FIRED, domestic-WATER HEATERS
- A. Commercial, Grid-Type, Finned-Tube, Gas-Fired, Domestic-Water Heaters:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Raypak; a Rheem company.
 - b. Lochinvar Corporation.
 - c. Laars Heating Systems Company; a subsidiary of Bradford White Corporation.
 2. Standard: ANSI Z21.13/CSA 4.9 for hot-water-supply boilers.
 3. Description: Packaged unit with boiler, storage tank, pump, piping, and controls.
 4. Boiler Construction: ASME code with 160-psig (1100-kPa) working-pressure rating for hot-water-boiler-type, domestic-water heater.
 - a. Heat Exchanger: Horizontal, straight, finned-copper tubes with bronze headers.
 - b. Connections: Factory fabricated of materials compatible with boiler. Attach to boiler before testing.
 - 1) NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 5. Boiler Appurtenances:
 - a. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire boiler except connections and controls.
 - b. Jacket: Steel with enameled finish.
 - c. Burner: For use with grid-type, finned-tube, gas-fired, domestic-water heaters and natural-gas fuel.
 - d. Automatic Ignition: ANSI Z21.20/CSA C22.2 No. 199, intermittent electronic-ignition system.
 - e. Temperature Control: Adjustable, storage-tank temperature-control fitting and flow switch, interlocked with circulator and burner.
 - f. Safety Control: Automatic, high-temperature-limit cutoff device or system.
 6. Support: Steel base or skids.
 7. Draft Hood: Draft diverter, complying with ANSI Z21.12.
 8. Automatic Damper: ANSI Z21.66/CSA 6.14-M, Thermally activated, automatic-vent-damper device with size matching draft hood.

9. Hot-Water Storage Tank: Connected with piping to circulating pump and domestic-water heater.
 - a. Construction: According to ASME Boiler and Pressure Vessel Code: Section VIII, steel with 125-psig (860-kPa) working-pressure rating.
 - b. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - 1) NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 - c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 10. Factory-Installed Storage-Tank Appurtenances:
 - a. Anode Rods: Factory installed, magnesium.
 - b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005, factory installed.
 - c. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - d. Jacket: Steel with enameled finish.
 - e. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 11. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately coupled in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, 125-psig (860-kPa) minimum working-pressure rating, and 225 deg F (107 deg C) continuous-water-temperature rating.
 12. Piping: Copper tubing; copper, solder-joint fittings; and brazed or flanged joints.
 13. Mounting: Domestic-water heater, tank, and accessories factory mounted on skids.
- B. Capacity and Characteristics:
1. Hot-Water Storage-Tank Capacity: 305 gal.
 2. Recovery: 327 gph at 80 deg F temperature rise.
 3. Temperature Setting: 140 deg F (60 deg C).
 4. Fuel Gas Demand: 264 cfh.
 5. Fuel Gas Input: 264,000 Btu/h.
 6. Gas Pressure Regulator:
 - a. Capacity: 264 cfh.
 7. Electrical Characteristics:
 - a. Volts: 120.
 - b. Phase: Single.
 - c. Hertz: 60.
 8. Minimum Vent Diameter: 7 inches.
- 2.2 domestic-WATER HEATER ACCESSORIES
- A. Domestic-Water Compression Tanks:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL Inc.
 - b. Flexcon Industries.
 - c. Taco, Inc.
 2. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

3. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.
 4. Capacity and Characteristics:
 - a. Working-Pressure Rating: 150 psig (1035 kPa).
 - b. Capacity Acceptable: 22 gal. minimum.
 - c. Air Precharge Pressure: 10 psi.
 - B. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.
 - C. Heat-Trap Fittings: ASHRAE 90.2.
 - D. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.
 - E. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.
 - F. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
 - G. Pressure Relief Valves: Include pressure setting less than domestic-water heater working-pressure rating.
 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
 - H. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.
- 2.3 SOURCE QUALITY CONTROL
- A. Factory Tests: Test and inspect assembled domestic-water heaters and storage tanks specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
 - B. Hydrostatically test commercial domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.
 - C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 domestic-WATER HEATER INSTALLATION

- A. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- B. Install gas-fired, domestic-water heaters according to NFPA 54.
 1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
 2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
 4. Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Section 231123 "Facility Natural-Gas Piping."
- C. Install commercial domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater

- relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."
 - F. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."
 - G. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.
 - H. Fill domestic-water heaters with water.
 - I. Charge domestic-water compression tanks with air.
- 3.2 CONNECTIONS
- A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."
 - B. Comply with requirements for fuel-oil piping specified in Section 231113 "Facility Fuel-Oil Piping."
 - C. Comply with requirements for gas piping specified in Section 231123 "Facility Natural-Gas Piping."
 - D. Drawings indicate general arrangement of piping, fittings, and specialties.
 - E. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.
- 3.3 IDENTIFICATION
- A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."
- 3.4 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
 1. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. **Leak Test:** After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 3. **Operational Test:** After electrical circuitry has been energized, start units to confirm proper operation.
 4. **Test and adjust controls and safeties.** Replace damaged and malfunctioning controls and equipment.
 - B. Prepare test and inspection reports.
- 3.5 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters.

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RESIDENTIAL PLUMBING FIXTURES

Section 22 41 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 1. Faucets.
 2. Showers.
 3. Bar sinks.
 4. Laundry trays.
 5. Disposers.
 6. Water closets.
 7. Toilet seats.
 8. Supply fittings.
 9. Waste fittings.
- B. Related Requirements:
 1. Section 224213.13 "Commercial Water Closets."
 2. Section 224216.13 "Commercial Lavatories."
 3. Section 224216.16 "Commercial Sinks."
 4. Section 224713 "Drinking Fountains."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
 1. Product Data for Prerequisite WE 1 and Credit WE 3: Documentation indicating flow and water consumption requirements.
 2. Product Data for Prerequisite WE 1: Documentation indicating flow and water consumption requirements.
 3. Product Data for Prerequisite WE 1: Documentation indicating flow and water consumption requirements.
- C. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted plumbing fixtures.
- B. Sample Warranty: For special warranty.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.
 3. Flushometer-Tank Repair Kits: Equal to 5 percent of amount of each type installed, but no fewer than two of each type.
 4. Toilet Seats: Equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 SHOWER FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Shower Faucets SH-1: Single handle, thermostatic, mixing valve.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Moen. Model T2444EP.
 - 2. Fixture:
 - a. Standard: ASME A112.18.1/CSA B125.1 and ASSE 1016.
 - b. General: Include hot- and cold-water indicators; check stops; and fixed shower head, arm, and flange. Coordinate faucet inlets with supplies.
 - c. Body Material: Solid brass.
 - d. Finish: Polished chrome plate.
 - e. Maximum Flow Rate: 1.75 gpm unless otherwise indicated.
 - f. Mounting: Concealed.
 - g. Backflow-Prevention Device for Hand-Held Shower: Not required.
 - h. Operation: Noncompression, manual.
 - i. Antiscald Device: Integral with mixing valve.
 - j. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
 - 3. Supply Connections: NPS 1/2 (DN 15).
 - 4. Shower Head:
 - a. Type: Ball joint.
 - b. Shower Head Material: Metallic with chrome-plated finish.
 - c. Spray Pattern: Fixed.
 - d. Integral Volume Control: Required.
 - e. Shower-Arm, Flow-Control Fitting: Not required.
- C. Shower Faucets SH-2: Single handle, thermostatic, mixing valve, accessible.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Powers Model e710J105Y0.
 - 2. Fixture:
 - a. Standard: ASME A112.18.1/CSA B125.1 and ASSE 1016.
 - b. General: Include hot- and cold-water indicators; check stops; and fixed shower head, arm, and flange. Coordinate faucet inlets with supplies.
 - c. Body Material: Solid brass.
 - d. Finish: Polished chrome plate.
 - e. Maximum Flow Rate: 1.5 gpm unless otherwise indicated.
 - f. Mounting: Concealed.
 - g. Backflow-Prevention Device for Hand-Held Shower: Required.
 - h. Operation: Noncompression, manual.
 - i. Antiscald Device: Integral with mixing valve.
 - j. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
 - 3. Supply Connections: NPS 1/2 (DN 15).
 - 4. Shower Head:
 - a. Type: Ball joint.
 - b. Shower Head Material: Metallic with chrome-plated finish.
 - c. Spray Pattern: Fixed.
 - d. Integral Volume Control: Required.
 - e. Shower-Arm, Flow-Control Fitting: Not required.

2.2 BAR SINKS

- A. Bar Sinks S-1: Single bowl, counter mounted, stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elkay Manufacturing Co.
 - b. Just Manufacturing.
 - c. Or approved equal.
 2. Fixture:
 - a. Standard: ASME A112.19.3/CSA B45.4 for stainless-steel lavatories.
 - b. Type: Self-rimming.
 - c. Overall Dimensions: 21 x 22.
 - d. Bowl Dimensions: 16 x 19 x 4.5.
 3. Faucet: S-1.
 4. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
 5. Waste Fittings: Comply with requirements in "Waste Fittings" Article.
- 2.3 LAUNDRY TRAYS
- A. Laundry Trays LS-1: Plastic laundry tray.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Swan Corporation (The). Model MF-1F.
 - b. Or approved equal.
 2. Fixture:
 - a. Standard: IAPMO/ANSI Z124.6.
 - b. Style: Flat-rim ledge.
 - c. Material: Cast polymer.
 - d. Nominal Size: 24 by 23 inches.
 - e. Color: White.
 - f. Mounting: Freestanding on manufacturer's standard legs or separate, painted-steel stand.
 3. Faucet: Swanstone Model CF-1000 Chrome Faucet.
 4. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
 5. Waste Fittings: Comply with requirements in "Waste Fittings" Article.
- 2.4 SINK FAUCETS
- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Sink Faucets S-1: Solid brass, bar sink.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Just Manufacturing. Model JTR-51-W4.
 - b. Chicago Faucets.
 - c. Moen Incorporated.
 2. Standard: ASME A112.18.1/CSA B125.1.
 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 4. Kitchen Sink Option: Separate hand spray complying with ASSE 1025.
 5. Finish: Polished chrome plate.
 6. Maximum Flow Rate: 1.5 gpm unless otherwise indicated.
 7. Mixing Valve: Two-lever handle.
 8. Backflow-Prevention Device for Hand Spray: Not required.
 9. Centers: 8 inches (203 mm).
 10. Mounting: Deck concealed.
 11. Handle(s): Wrist blade, 4 inches (102 mm).
 12. Spout Type: Swivel gooseneck.
 13. Spout Outlet: 1.5 Aerator.
 14. Drain: Grid.

- C. Sink Faucets S-2, S-3: Solid brass, kitchen sink.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Chicago Faucets. Model 1102 CP
 2. Standard: ASME A112.18.1/CSA B125.1.
 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 4. Kitchen Sink Option: Separate hand spray complying with ASSE 1025.
 5. Finish: Polished chrome plate.
 6. Maximum Flow Rate: 2.2 gpm unless otherwise indicated.
 7. Mixing Valve: Two-lever handle.
 8. Backflow-Prevention Device for Hand Spray: Not required.
 9. Centers: 8 inches (203 mm).
 10. Mounting: Deck.
 11. Handle(s): Wing.
 12. Spout Type: Swivel.
 13. Spout Outlet: 1.5 Aerator.
 14. Drain: Lift and turn.
 15. Pre-Rinse Unit (PR-1): Model No. B-0133-BC manufactured by T & S Brass and Bronze Works, Inc.

2.5 DISPOSERS

- A. Disposers GD-1: Continuous-feed household, food waste.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. InSinkErator. Evolution Series.
 2. Standards: ASSE 1008 and UL 430, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. General: Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; NPS 1-1/2 (DN 40) outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper.
 4. Model: Sound-insulated chamber.
 5. Motor: 115-V ac, 1725 rpm, 1/2 hp with overload protection.

2.6 WATER CLOSETS

- A. Water Closets WC-1: Floor mounted, floor outlet, close coupled (gravity tank), vitreous china.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kohler Co. Model K-3519.
 - b. American Standard America.
 - c. TOTO USA, INC.
 2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1, ASME A112.19.5, and ASSE 1037.
 - b. Bowl Type: Pressure Assist.
 - c. Height: Standard.
 - d. Rim Contour: Elongated.
 - e. Water Consumption: Water saving.
 - f. Color: White.
 3. Toilet Seat: WC-1.
 4. Supply Fittings:
 - a. Standard: ASME A112.18.1/CSA B125.1.
 - b. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.
 - c. Stop: Chrome-plated-brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.
 - 1) Operation: Loose key.

- d. Riser:
 - 1) Size: NPS 1/2 (DN 15).
 - 2) Material: ASME A112.18.6, braided- or corrugated-stainless-steel flexible hose riser.

2.7 TOILET SEATS

- A. Toilet Seats WC-1, WC-3:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Olsonite Seat Co.
 - b. Church Seats.
 - c. Bemis Manufacturing Company.
 - 2. Standard: IAPMO/ANSI Z124.5.
 - 3. Material: Plastic.
 - 4. Type: Commercial (Standard).
 - 5. Shape: Elongated rim (Open front).
 - 6. Configuration: Open front without cover.
 - 7. Size: Elongated.
 - 8. Hinge Type: Self-sustaining.
 - 9. Hinge Material: Plastic.
 - 10. Seat Cover: Not required.
 - 11. Toilet Seat Height: Toilet Seat height in front shall be 1.25-inches.
 - 12. Color: White.

2.8 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Lavatory, Bar Sink, Kitchen Sink and Laundry Tray Supply Fittings:
 - 1. Supply Piping: Chrome-plated-brass pipe or chrome-plated-copper tube matching water-supply piping size. Include chrome-plated wall flange.
 - 2. Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression stop with inlet connection matching water-supply piping type and size.
 - a. Operation: Loose key.
 - 3. Risers:
 - a. Size: NPS 3/8 (DN 10) for lavatories.
 - b. Size: NPS 1/2 (DN 15) for bar sinks kitchen sinks and laundry trays.
 - c. Material: ASME A112.18.6, braided- or corrugated-stainless-steel flexible hose riser.

2.9 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/4 (DN 32) offset tailpiece for accessible lavatories.
- C. Drain: Grid type with NPS 1-1/2 (DN 40) offset tailpiece for accessible bar sinks and kitchen sinks.
- D. Trap:
 - 1. Size: NPS 1-1/2 (DN 40) for lavatories.
 - 2. Size: NPS 1-1/2 (DN 40) for bar sinks kitchen sinks and laundry trays.
 - 3. Material: Chrome-plated, one-piece, cast-brass trap with swivel 0.029-inch- (73-mm-) thick tubular brass wall bend; and chrome-plated-brass or -steel wall flange.

2.10 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing-fixture installation.
- B. Examine walls, floors, cabinets, and counters for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install plumbing fixtures level and plumb according to roughing-in drawings.
- B. Install floor-mounted water closets on closet flange attachments to drainage piping.
- C. Install counter-mounting fixtures in and attached to casework.
- D. Install pedestal lavatories on pedestals and secured to wood blocking in wall.
- E. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- F. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- G. Install toilet seats on water closets.
- H. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- I. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- J. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes unless otherwise indicated.
- K. Install disposer in outlet of each sink indicated to have a disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.
- L. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install on countertop at sink. Connect inlet hose to dishwasher and outlet hose to disposer.
- M. Install hot-water dispensers in back top surface of sink or in countertop with spout over sink.
- N. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories and sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."
- O. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- P. Seal joints between plumbing fixtures, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories and sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.4 ADJUSTING

- A. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. After completing installation of plumbing fixtures, inspect and repair damaged finishes.

- B. Clean plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed plumbing fixtures and fittings.
- D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

* * *

COMMERCIAL LAVATORIES

Section 22 42 16.13

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
 - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
 - A. Section Includes:
 - 1. Lavatories.
 - 2. Faucets.
- 1.3 ACTION SUBMITTALS
 - A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - B. LEED Submittals:
 - 1. Product Data for Prerequisite WE 1 and Credit WE 3: Documentation indicating flow and water consumption requirements.
 - 2. Product Data for Prerequisite WE 1: Documentation indicating flow and water consumption requirements.
 - 3. Product Data for Prerequisite WE 1: Documentation indicating flow and water consumption requirements.
 - C. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.
- 1.4 INFORMATIONAL SUBMITTALS
 - A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.
- 1.5 CLOSEOUT SUBMITTALS
 - A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Servicing and adjustments of automatic faucets.
- 1.6 MAINTENANCE MATERIAL SUBMITTALS
 - A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

- 2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES
 - A. Lavatory L-2: Ledge back, vitreous china, wall mounted.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kohler Co model K-2035
 - b. American Standard America.
 - c. Or approved equal.
 - 2. Fixture:
 - a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: For wall hanging.
 - c. Nominal Size: 22 by 18 inches.
 - d. Faucet-Hole Punching: Three holes, 2-inch (51-mm) centers.
 - e. Faucet-Hole Location: Top.

- f. Color: White.
 - g. Mounting Material: Chair carrier.
 - 3. Faucet: L-2.
 - 4. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier.
- 2.2 SOLID-BRASS, MANUALLY OPERATED FAUCETS
- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
 - B. Lavatory Faucets L-1: Manual-type, single-control mixing, commercial, solid-brass valve.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Moen Incorporated, Model 8433.
 - 2. Standard: ASME A112.18.1/CSA B125.1.
 - 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 - 4. Body Type: Centerset.
 - 5. Body Material: Commercial, solid brass.
 - 6. Finish: Polished chrome plate.
 - 7. Maximum Flow Rate: 0.5 gpm (1.5 L/min.).
 - 8. Maximum Flow: 0.25 gal. (0.95 L) per metering cycle.
 - 9. Mounting Type: Deck, exposed.
 - 10. Valve Handle(s): Single lever.
 - 11. Spout: Rigid type.
 - 12. Spout Outlet: Aerator.
 - 13. Operation: Noncompression, manual.
 - 14. Drain: Grid.
 - C. Lavatory Faucets L-2: Automatic-type, battery-powered, electronic-sensor-operated, mixing, commercial, solid-brass valve.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Sloan, Model EBF-85 BDT.
 - 2. Standard: ASME A112.18.1/CSA B125.1 and UL 1951.
 - 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 - 5. Body Type: Centerset.
 - 6. Body Material: Commercial, solid brass.
 - 7. Finish: Polished chrome plate.
 - 8. Maximum Flow Rate: 0.5 gpm (1.5 L/min.).
 - 9. Maximum Flow: 0.25 gal. (0.95 L) per metering cycle.
 - 10. Mounting Type: Deck, exposed.
 - 11. Valve Handle(s): Single lever.
 - 12. Spout: Rigid type.
 - 13. Spout Outlet: Aerator-Ultra low flow.
 - 14. Below Deck Thermostatic Mixing Valve.
 - 15. Drain: Grid.
- 2.3 SUPPLY FITTINGS
- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
 - B. Standard: ASME A112.18.1/CSA B125.1.
 - C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
 - D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

- E. Operation: Loose key.
 - F. Risers:
 - 1. NPS 1/2 (DN 15).
 - 2. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.
- 2.4 WASTE FITTINGS
- A. Standard: ASME A112.18.2/CSA B125.2.
 - B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.
 - C. Trap:
 - 1. Size: NPS 1-1/2 by NPS 1-1/4 (DN 40 by DN 32).
 - 2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube to wall; and chrome-plated, brass or steel wall flange.
 - 3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lavatories level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 18 "Escutcheons for Plumbing Piping."
- E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 22 07 19 Plumbing Piping Insulation.

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

* * *

COMMERCIAL SINKS

Section 22 42 16.16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Service sinks.
 - 2. Sink faucets.
- B. Related Requirements:
 - 1. Section 224100 "Residential Plumbing Fixtures" for residential sinks.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
 - 1. Product Data for Prerequisite WE 1 and Credit WE 3: Documentation indicating flow and water consumption requirements.
 - 2. Product Data for Prerequisite WE 1: Documentation indicating flow and water consumption requirements.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sinks to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SERVICE SINKS

- A. Service Sinks MS-1: Enameled, cast iron, floor mounted.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Standard America.
 - b. Commercial Enameling Company.
 - c. Kohler Co.
 - 2. Fixture:
 - a. Standard: ASME A112.19.1/CSA B45.2.
 - b. Style: With front apron and raised back.
 - c. Nominal Size: 28 by 28 inches (710 by 710 mm).
 - d. Color: White.
 - e. Drain: Grid with NPS 3 (DN 80) outlet.
 - f. Rim Guard: Coated wire.
 - 3. Faucet: MS-1.

2.2 SINKS

- A. Sinks S-1: Stainless steel, freestanding.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Just Manufacturing Model SB-136-24RL.
 - b. Or approved equal.
 2. Fixture:
 - a. Standard: ASME A112.19.3/CSA B45.4.
 - b. Type: With backsplash.
 - c. Number of Compartments: Two.
 - d. Overall Dimensions: 87 inches by 27 inches.
 - e. Metal Thickness: 0.050 inch (1.3 mm).
 - f. Compartment:
 - 1) Dimensions: <Insert dimensions>.
 - 2) Drain: [Grid with NPS 1-1/2 (DN 40) tailpiece and twist drain] [Grid with NPS 2 (DN 50) tailpiece and twist drain] [NPS 1-1/2 (DN 40) tailpiece with stopper] <Insert drain>.
 - 3) Drain Location: [Centered in compartment] [Near back of compartment] [Near left side of compartment] [Near right side of compartment] <Insert location>.
 - g. Each Compartment:
 - 1) Dimensions: 18 inches by 24 inches.
 - 2) Drains: Grid with NPS 1-1/2 (DN 40) tailpiece and twist drain.
 - 3) Drain Location: Centered in compartment.
 - h. Drainboard(s): Both side(s).
 - 1) Dimensions Each: 24 inches by 24 inches.
 3. Supports: Adjustable-length steel legs.
 4. Faucet(s): S-1.
 - a. Number Required: One.
 - b. Mounting: On backsplash.
 5. Supply Fittings:
 - a. Standard: ASME A112.18.1/CSA B125.1.
 - b. Supplies: Chrome-plated brass compression stop with inlet connection matching water-supply piping type and size.
 - 1) Operation: Loose key.
 - 2) Risers: NPS 1/2 (DN 15), chrome-plated, rigid-copper pipe.
 6. Waste Fittings:
 - a. Standard: ASME A112.18.2/CSA B125.2.
 - b. Trap(s):
 - 1) Size: NPS 1-1/2 (DN 40)].
 - 2) Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube to wall; and chrome-plated brass or steel wall flange.
 - c. Continuous Waste:
 - 1) Size: NPS 1-1/2 (DN 40).
 - 2) Material: Chrome-plated, 0.032-inch- (0.83-mm-) thick brass tube.
- 2.3 SINK FAUCETS
- A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.
 - B. Sink Faucets MS-1: Manual type, two-lever-handle mixing valve.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Chicago Faucets.
 - b. Speakman Company.
 - c. Or approved equal.
 2. Standard: ASME A112.18.1/CSA B125.1.

3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
 4. Body Type: Widespread.
 5. Body Material: Commercial, solid brass.
 6. Finish: Chrome plated.
 7. Maximum Flow Rate: 2.2 gpm (8.3 L/min.).
 8. Handle(s): Wrist blade, 4 inches (102 mm).
 9. Mounting Type: Back/wall, exposed.
 10. Spout Type: Rigid, solid brass with wall brace.
 11. Vacuum Breaker: Required for hose outlet.
 12. Spout Outlet: Hose thread according to ASME B1.20.7.
- C. Sink Faucets S-1: Manual type, two-lever-handle mixing valve.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Just Sinks Model JS-47-TGSA.
 - b. Or approved equal.
 2. Standard: ASME A112.18.1/CSA B125.1.
 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
 4. Body Type: Widespread.
 5. Body Material: Commercial, solid brass.
 6. Finish: Chrome plated.
 7. Maximum Flow Rate: 2.2 gpm (8.3 L/min.).
 8. Handle(s): Wing handles.
 9. Mounting Type: Back/wall, exposed.
 10. Spout Type: Swivel Gooseneck.
 11. Vacuum Breaker: Not Required.
 12. Spout Outlet: Aerator.
- 2.4 GROUT
- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
 - B. Characteristics: Nonshrink; recommended for interior and exterior applications.
 - C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.
- B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install sinks level and plumb according to roughing-in drawings.
- B. Set floor-mounted sinks in leveling bed of cement grout.
- C. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- D. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."

- C. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."
- 3.4 ADJUSTING
- A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.
 - B. Adjust water pressure at faucets to produce proper flow.
- 3.5 CLEANING AND PROTECTION
- A. After completing installation of sinks, inspect and repair damaged finishes.
 - B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
 - C. Install protective covering for installed sinks and fittings.
 - D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

* * *

EMERGENCY PLUMBING FIXTURES

Section 22 45 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Eye/face wash equipment.
 - 2. Supplemental equipment.
 - 3. Water-tempering equipment.

1.3 DEFINITIONS

- A. Accessible Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.
- B. Plumbed Emergency Plumbing Fixture: Fixture with fixed, potable-water supply.
- C. Self-Contained Emergency Plumbing Fixture: Fixture with flushing-fluid-solution supply.
- D. Tepid: Moderately warm.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include flow rates and capacities, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Submit certificates of performance testing specified in "Source Quality Control" Article.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For emergency plumbing fixtures to include in operation and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Flushing-Fluid Solution: Separate lot and equal to at least 200 percent of amount of solution installed for each self-contained unit.

1.8 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."
- C. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.
- D. Regulatory Requirements: Comply with requirements in ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

PART 2 - PRODUCTS

- A. Sink, Pull-down, Plumbed, Eye/Face Wash Unit, EEW-1:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Haws Corporation Model 7610.
 - b. Guardian Equipment Co.
 - c. WaterSaver Faucet Co.
 - 2. Capacity: Not less than 3 gpm (11.4 L/min.) for at least 15 minutes.
 - 3. Supply Piping: NPS 1/2 (DN 15) chrome-plated brass or stainless steel with flow regulator and stay-open control valve.

4. Control-Valve Actuator: Pull-Down.
 5. Spray-Head Assembly: Single spray head positioned over sink.
 6. Mounting: Sink/Countertop.
 7. Tempering Valve: Haws Model TWBS EWE Lead-Free.
- 2.2 SOURCE QUALITY CONTROL
- A. Certify performance of emergency plumbing fixtures by independent testing organization acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water piping systems to verify actual locations of piping connections before plumbed emergency plumbing fixture installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EMERGENCY PLUMBING FIXTURE INSTALLATION

- A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.
- B. Install fixtures level and plumb.
- C. Fasten fixtures to substrate.
- D. Install shutoff valves in water-supply piping to fixtures. Use ball, gate, or globe valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
 1. Exception: Omit shutoff valve on supply to group of plumbing fixtures that includes emergency equipment.
 2. Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.
- E. Install dielectric fitting in supply piping to emergency equipment if piping and equipment connections are made of different metals. Comply with requirements for dielectric fittings specified in Section 221116 "Domestic Water Piping."

3.3 CONNECTIONS

- A. Connect hot- and cold-water-supply piping to hot- and cold-water, water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for hot- and cold-water piping specified in Section 221116 "Domestic Water Piping."
- B. Where installing piping adjacent to emergency plumbing fixtures, allow space for service and maintenance of fixtures.

3.4 IDENTIFICATION

- A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment. Comply with requirements for identification materials specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

- A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities.
- B. Tests and Inspections:
 1. Perform each visual and mechanical inspection.
 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Emergency plumbing fixtures will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

- 3.6 ADJUSTING
- A. Adjust or replace fixture flow regulators for proper flow.
 - B. Adjust equipment temperature settings.

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DRINKING FOUNTAINS

Section 22 47 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes drinking fountains and related components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of drinking fountain.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include operating characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
 - 1. Product Data for Prerequisite WE 1 and Credit WE 3: Documentation indicating flow and water consumption requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

- A. Drinking Fountains DF-1: Stainless steel, wall mounted.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Haws Corporation. Model 119.
 - b. Elkay Manufacturing Co.
 - c. Halsey Taylor.
 - 2. Standards:
 - a. Comply with ASME A112.19.3/CSA B45.4.
 - b. Comply with NSF 61.
 - 3. Type Receptor: Slab.
 - 4. Receptor Shape: Rectangular.
 - 5. Back Panel: Stainless-steel wall plate behind drinking fountain.
 - 6. Bubblers: Two, with adjustable stream regulator, located on deck.
 - 7. Control: Push button.
 - 8. Drain: Grid type with NPS 1-1/4 (DN 32) tailpiece.
 - 9. Supply: NPS 3/8 (DN 10) with shutoff valve.
 - 10. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 (DN 32) chrome-plated brass P-trap and waste.
 - 11. Support: ASME A112.6.1M, Type III lavatory carrier.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.
- B. Examine walls and floors for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.
- C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball, gate, or globe valve. Install valves in locations

where they can be easily reached for operation. Valves are specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

- D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 18 "Escutcheons for Plumbing Piping."
- F. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 22 11 16 "Domestic Water Piping."
- C. Install ball, gate, or globe shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."
- D. Comply with soil and waste piping requirements specified in Section 22 13 16 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

- A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.
- C. Provide protective covering for installed fixtures.
- D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

* End Division 22 *

Division 23 - HEATING, VENTILATING AND AIR CONDITIONING

MECHANICAL GENERAL REQUIREMENTS Section 23 00 10

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions and Supplementary Conditions shall apply to and form part of this Division.

1.2 SUMMARY

- A. Work includes, but is not limited to, the following:
 - 1. Labor, material, equipment and transportation to complete the Work as shown on the drawings, specified herein and/or implied thereby.
 - 2. A requirement of the plumbing sections shall be to provide make-up water and drain final connections to systems and equipment.
 - 3. It is the intent of the project that the installation be coordinated to provide a complete and usable facility.
- B. Work not included in this division:
 - 1. Painting, except as hereinafter specified. See Division 9 for painting.
 - 2. Electrical, except for controls hereinafter specified. See Division 26 for electrical.
- C. Related Sections include the following:
 - 1. Division 1 Section 01 91 00 "General Commissioning Requirements."
 - 2. Division 23 Section 23 08 00 "Commissioning of HVAC Systems."
 - 3. Division 23 Section 23 00 50 "Basic Mechanical Materials and Methods."
 - 4. Division 1 Section 01 33 29 "Sustainable Design Reporting."

1.3 DEFINITIONS

- A. Unless otherwise specified, "all clarification from," "field direction by," "submittals to," "approved by," "processed by," "permission from," and like mentioned herein shall mean from/by/to Architect.
- B. "Provide" means furnish and install referenced item with all appurtenances.
- C. "Shall" indicates a mandatory requirement.
- D. "Air conditioning" is defined as the treatment and/or handling of any air to any degree by the systems shown on the drawings and herein specified and is not restricted to refrigerated cooling.

1.4 DELIVERY AND STORAGE OF MATERIALS

- A. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work. Replace all damaged and defective work, material or equipment prior to filing application for final acceptance. Properly protect all openings to equipment, piping, ductwork, accessories, etc. from dirt, dust, and debris prior to and during installation of the work. Ductwork stored at the jobsite shall be covered to protect from dirt, dust, debris, fire proofing, etc.

1.5 CODES AND STANDARDS

- A. Work and materials shall be in full accordance with the latest rules and regulations of the Local Fire Marshal; the National Electric Code (NEC); the Uniform Plumbing Code; the California Plumbing Code; California Administrative Code, Title 24, (CAL/OSHA); Local Building Codes; the Uniform Mechanical Code; the California Mechanical Code; Vol. II of the Uniform Building

Code; Volume I and II of the California Building Code; SMACNA "Guidelines for Seismic Restraints of Mechanical Systems"; and other applicable codes, laws or regulations of bodies lawfully empowered and having jurisdiction over this project. Nothing in the plans or specifications shall be construed to permit work not conforming to these codes. When codes conflict with one another, provide larger, higher or more restrictive standards without additional costs.

1.6 PERMITS

- A. Obtain all permits, patent rights, and licenses that are required for the performing of this work by all laws, ordinances, rules and regulations, or orders of any officer and/or body. Provide all notices necessary in connection therewith, and pay all fees relating thereto and all costs and expenses incurred on account thereof. No work shall be covered before inspection by the jurisdictional authorities and observation by the Architect or the owner's designated representatives.

1.7 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. Drawings and specifications are intended to be read together so that any work mentioned in one and not the other shall be executed the same as if mentioned in both.
- B. For purposes of clearness and legibility, drawings are essentially diagrammatic. The size and location of equipment is drawn to scale wherever possible. Contractor shall make use of data in the contract documents and shall verify this information at the building site.
- C. Where the contract specifications and/or drawings are in conflict, obtain clarification of such during bidding. Where addenda for clarification of such is not timely, base the bid on the higher standards or more restrictive requirements; prior to fabrication, obtain written clarification.
- D. The drawings indicate required size and points of termination of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. It is not intended that drawings indicate necessary offsets. The Contractor shall make the installation in such a manner as to conform to the structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or costs to the Owner.
- E. It is intended that apparatus be located symmetrical with architectural elements. Refer to architectural details in completing the correlating work.
- F. The Contractor shall study drawings and specifications including, and not limited to, architectural, structural, mechanical, plumbing, fire protection, and electrical to determine conflict with ordinances and statutes. Errors or omissions shall be reported in writing, and changes shall be included in the as-built drawings and the additional work performed at no cost to the Owner.
- G. Submittal of bid shall indicate the Contractor has examined the site and drawings and has included required allowances in his bid. No allowance shall be made for any error resulting from Contractor's failure to visit job site and to review drawings and specifications. Bid shall include costs for required drawings and changes as outline above, all at no cost to owner.
- H. Prior to any work commencing, Contractor to schedule a coordination meeting with all applicable contractors, including the Mechanical Engineer, Cx Agent, and Architect, to perform a page-turning meeting and to understand the mechanical requirements.

1.8 RECORD DRAWINGS

- A. In addition for requirements for shop drawings specified elsewhere, provide and maintain on the job one complete set of blue line prints of the record drawings for all the mechanical and plumbing work. Carefully record on this set of prints, work including piping, valves, etc., which is installed differently from that indicated in the specifications and on the drawings; locate dimensionally from fixed points. The depth shall be indicated for all plugged wyes, tees and capped lines.
- B. These record drawings shall be continuously kept up-to-date, and shall be available for inspection at all times. Existing lines discovered shall be indicated on these drawings.
- C. At completion of work, provide a neat and legible reproducible set of these up-to-date record drawings which shall be individually signed and dated by the Contractor and the job inspector as to their accuracy.

- D. Record drawings shall be submitted for acceptance and approval to the Architect and Mechanical Engineer before final certificate of acceptance will be issued.
- E. Record drawings shall show the exact location of all control sensor devices.
- 1.9 CUTTING AND PATCHING
 - A. Perform all cutting and fitting required for work of this section in rough construction of the building. Obtain permission of the Structural Engineer prior to cutting any structural building elements.
 - B. All patching of finished construction of building shall be performed under the sections of specifications covering these materials by the trades at no additional cost to the Owner.
 - C. All cutting of concrete work by Contractor shall be by core drilling or concrete saw. No cutting or coring shall be done without first obtaining the permission of the Architect and Owner.
 - D. All patching of existing surfaces shall match existing material and finish.
- 1.10 DAMAGE BY LEAKS
 - A. Contractor shall be responsible for damage to the grounds, walks, roads, buildings, finishes, surfaces, materials, equipment, piping systems, electrical systems and their equipment and contents, caused by leaks in the piping systems being installed or having been installed herein. He shall repair at his expense all damage so caused. All repair work shall be done as directed by the Architect and Owner.
- 1.11 EMERGENCY REPAIRS
 - A. The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibilities.
- 1.12 LOCATIONS
 - A. Coordinate in advance of the work, requirements for openings, equipment maintenance clearances, recesses and chases in the walls, partitions, equipment housekeeping pads, framing or openings. Should furnishing this information be neglected, delayed or incorrect and additional cutting is found to be required, the cost of same shall be borne by the Contractor. Nothing in this paragraph shall be construed to relieve the Contractor of the responsibility for providing and paying for the required core drilling and openings in existing work.
 - B. Diagrammatic Indications on Drawings are:
 - 1. Approximate only.
 - 2. At various locations shown distorted for clarity.
 - C. Exact Locations Shall:
 - 1. Be as required for proper installation in available space.
 - 2. Avoid interference with architectural, electrical and structural features.
 - 3. Be coordinated with the work of other trades toward the general purpose of having the work progress rapidly and smoothly with a minimum interference between one trade and another.
 - 4. Preserve headroom and keep openings and passageways clear.
 - 5. Have a neat arrangement symmetrical to the building lines, light and tile pattern.
 - 6. Be reasonably accessible for hung ceiling areas for maintenance from the floor below. Equipment, valves, and other items requiring maintenance, adjustment and/or observation shall be accessible.
- 1.13 SUPPORTS, EQUIPMENT PADS, STAGING, ETC.
 - A. Construction supports required for the proper installation of equipment shall be in accordance with the drawings, manufacturer's requirements, seismic requirements, and applicable codes. Check architectural and structural drawings for equipment pads by others. Provide staging, scaffolds, platforms, ladders or similar facilities required to properly install the work.
- 1.14 INTERRUPTION OF UTILITIES
 - A. The Contractor shall schedule and coordinate all interruptions of utilities with the Architect and Owner within 30 days after award of contract. The Contractor shall submit to the Owner a schedule of proposed interruptions. At least 72 hours prior to the interruption, the contractor shall submit a request indicating the proposed date and duration of interruption, the work to be

accomplished, the areas which will be affected and a proposed contingency plan to be followed in the event that normal service or facilities cannot be restored on schedule. Do not commence work until the time, date, and contingency have been approved in writing by the Architect and Owner.

- B. Provide any labor and materials necessary to restore services on a contingency basis should normal service or facilities not be restored on schedule.
- C. Preparatory work associated with each interruption shall be performed during normal work hours. The actual interruption required for tie-in shall be performed between 8 P.M. and 5 A.M. Maximum shutdown during this period of any system shall be 4 hours.

1.15 SUBSTITUTIONS

- A. If substitutions of controls or equipment requires any changes in the architectural, structural, mechanical, plumbing or electrical work from that shown on the drawings (including all environmental characteristics), the extra cost of the equipment or architectural, structural, mechanical, plumbing or electrical work shall be responsibility of the Contractor requesting the substitution. All substitutions shall be approved by the Architect before purchase by the contractor.
- B. If the Contractor proposes substitutions of any equipment specified herein or on the drawings, it shall be the Contractor's responsibility to obtain approval from the Architect for such equipment as well as approval for anchorage of such equipment from the Architect, Structural Engineer, and governing approval agencies (Department of the State Architects - DSA),. All costs required for such approval shall be the responsibility of the Contractor requesting the substitution.

1.16 PREPARATION OF SUBMITTALS

- A. Refer to Division 1. In addition to the requirements of Division 1, provide the requirements specified herein.
- B. Prior to commencement of work and in accordance with the General Requirements, submit for review six copies of proposed equipment and material submittals. The Contractor shall verify the delivery dates are compatible with the specified construction schedule; and verify the equipment is sized to accommodate the conditions specified. Submittals shall include manufacturer's names and model numbers and shall comply with specifications and drawings. The Contractor shall bear the cost of changes necessary to accommodate substitutions if substitution is approved.
- C. Provide formal submittal to Architect. Review of the formal submittal is only for general conformance with design concept of project and general compliance with the information given in the contract documents. The Contractor is responsible for confirmation and correlation of the dimensions, quantities and sizes, for information that pertains to fabrication methods or construction techniques, and for coordination of work of all trades. Deviations from Drawings and Specifications shall be clearly and completely indicated (by a separate letter) in the formal submittals. Reviewed Submittals shall not relieve the Contractor of responsibility for errors or deviations.
 - 1. Where specific model numbers and/or manufacturers are specified or shown, it is the intent of the contract documents to procure the specified item(s). Alternate equipment may not be used unless data is submitted for consideration as a substitution in accordance with General Requirements and this section.
 - 2. Model numbers used may not indicate all features or options required for this specific installation. Modify the specified models to comply with the requirements, as specified or shown.
 - 3. Product Data for Proposed Substitutions:
 - a. Submit copies of complete data, with drawings and samples as appropriate, including:
 - 1) Comparison of the qualities of the proposed substitution with that specified.
 - 2) Changes required in other elements of the work because of the substitution.
 - 3) Affect on construction schedule.
 - 4) Cost data comparing the proposed substitution with the product specified.

- 5) Availability of maintenance service and source of replacement materials.
 - 6) Reference to three (3) projects similar to this where such equipment is installed and operating to two (2) or more years.
- b. Acceptance of substitutions is entirely at the discretion of the Architect.
- D. Formal submittals shall be complete with catalog data and information properly marked to indicate equality of material (where substitution is allowed and desired), adequacy in capacity and performance to meet minimum capacities or performance as specified or indicated. Arrange the submittals in the same sequence as these Specifications and indicate the Section and Paragraph number (in the upper right-hand side with tabs) for which each submittal is intended. Incomplete submittals shall be rejected.
- E. Do not fabricate order or deliver materials or equipment until formal submittals have been approved. Where material or equipment is used without such permission, it is deemed that the material or equipment shall be in complete compliance with drawings and specifications, without additional cost where such compliance is lacking and may be required to be altered in the field.
- F. Submittals shall be bound and shall include, at a minimum, the following:
1. Complete bill of materials listing equipment furnished.
 2. Catalog cut sheets of every component being provided (highlighted).
 3. Provide completed blue-line shop drawings of the packaged equipment detailing all field connection points.
 4. Dimensions, clearance requirements, weights, and capacities.
 5. Wiring diagrams showing control interface as applicable.
 6. Warranty sheets.
 7. Pressure drops as applicable.
- G. Contractor shall incur all costs for time spent by Engineer for review of more than two submittals on each item. Costs shall be based on Engineer's hourly billing rate schedule at the time of review. Rate schedule available upon request. Engineer shall invoice the contractor upon completion of review and shall be paid by the contractor within 30 days of date of invoice. Failure to remit will withdraw approval (if any) of submittals in question.
- 1.17 SHOP DRAWINGS:
- A. Proceed with preparation of shop drawings immediately upon receiving an authorization to proceed for the project. Shop drawings shall be originally prepared by the contractor. Provide minimum 1/4" scale shop drawings in electronic format. Submit a complete set in one package prior to material fabrication, order and installation.
- B. Include:
1. Duct and pipe elevations and sizes.
 2. Double line ductwork and piping (4" and larger).
 3. Actual size of purchased equipment from certified shop drawings.
 4. Access panels including ceiling panels.
 5. Access clearances for equipment.
 6. Actual locations of ceiling diffusers/ supply registers and return registers.
 7. Actual locations of manual volume dampers.
 8. Locations of structural penetrations such as beams.
 9. Actual location of control panels and power connections to equipment.
 10. Color coded duct and piping based on material used.
 11. Label and tag schedule for equipment.
 12. Duct transitions to clear beams or tight areas.
 13. Room temperature sensor locations.
 14. Point of connection to utilities outside the building.
 15. Sections or 3-dimensional drawings of congested areas.
 16. Gridlines.
 17. Duct and piping supports on roof.
- C. Coordinate with other trades in preparation of shop drawings.

- D. Submit a copy of coordinated shop drawings to General Contractor for distribution to other trades, including electrical and fire sprinkler contractor.
 - E. Submit to commissioning agent for approval to assure design intent is met.
 - F. Prior to fabrication and upon receiving approval from commissioning agent, submit a complete set of shop drawings at one time to the mechanical engineer.
- 1.18 ELECTRICAL REQUIREMENTS
- A. Coordinate the following items with Division 26:
 - 1. Power wiring
 - 2. Power Supply Voltage Requirements
 - 3. Safety switches
 - 4. Combination controllers
 - 5. Disconnect switches
 - 6. Motor starters
 - 7. Circuit breakers
 - 8. Motor-control equipment forming part of motor control centers or switchgear assemblies
 - 9. Electrical connections of the mechanical equipment to the electrical power source shall be coordinated with and provided under Division 26.
- 1.19 MOTORS
- A. Before order is placed for electrical devices, the Contractor shall check with the Electrical contractor and verify requirements as to type, mounting and current characteristics as well as to any special delivery instructions. Motors provided under Division 23 shall be minimum of 10% normal rating above brake horsepower (BHP) rating of equipment driven.
- 1.20 TESTS
- A. Contractor shall make tests required by legally constituted authorities and as listed below.
 - 1. Tests shall be made in the presence of the Owner or his representative and a duly authorized inspector. The Owner or his representative shall be notified 5 days before tests are made.
 - 2. Concealed work and insulated work shall remain uncovered until required testing has been performed and approved by the Owner. If work to be tested is covered before the approval of the Owner or his authorized representative has been obtained, it shall be uncovered for testing at the Contractor's expense.
 - 3. Obtain required documents of certification indicating approval, acceptance and compliance with the requirements of all administrative authorities having jurisdiction over the work. No final payment shall be made until all such certificates are delivered to the Owner.
 - 4. Furnish labor, materials, instruments and bear other costs in connection with all tests.
 - 5. Piping systems, except as hereinafter noted, shall be given hydrostatic (with water) test of a least 150% of the maximum operating pressure but no less than 150 psig.
 - 6. Before making test, remove or valve off from the system, gauges, traps, and other apparatus or equipment which may be damaged by test pressure.
 - 7. Install a calibrated test pressure gauge in the system to observe any loss in pressure. Maintain the required test pressure for a sufficient length of time to enable an inspection to be made of all joints and connections. Perform tests after installation and prior to acceptance.
 - 8. Final pressures at the end of the test period shall be no more or less than that caused by expansion or contraction of the test medium due to temperature changes.
 - 9. After tests have been made and leaks repaired, clean and flush systems as hereinafter specified. Water piping shall be left under supply main pressure for the balance of the construction period.
 - 10. Tests for mechanical, plumbing, and fire protection systems are specified within their own section. Equipment and ductwork system tests are specified in the test and balance section.

11. Provide necessary provisions and tests for maintaining the operational condition and cleanliness of existing systems.
- 1.21 LABOR AND MATERIALS
 - A. Labor shall be carefully skilled for this kind of work, and under the direction of a competent foreman.
 - B. Materials shall be new, in perfect condition and of domestic manufacturer. Materials for similar uses to be of same type and manufacturer.
 - C. Equipment shall bear the manufacturer's label showing performance characteristics. Identifying size number shall be given only when it is not practicable or customary to show performance characteristics.
 - D. Valves, pipe, fittings, etc., shall bear the manufacturer's name or trademark.
 - E. Unless otherwise specified herein, equipment and fixtures shall be installed in accordance with the manufacturer's recommendations, including recommended service and removal clearances.
 - 1.22 PROTECTION AND CLEAN-UP
 - A. Protection: Provide for the safety and good condition of materials and equipment until final acceptance of the Architect. Protect materials and equipment from dirt, dust, debris, and damage from any cause whatever, and provide adequate and proper storage facilities during the progress of the work and replace all damaged and defective material, equipment or work precedent to filing application for final acceptance.
 - B. Cleaning:
 1. Unless a more stringent requirement is specified, thoroughly clean all parts of the piping, ductwork, fixtures, apparatus and equipment. All parts shall be thoroughly cleaned of dirt, dust, debris, cement, plaster and other materials, and all grease and oil spots removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out. Clean all systems, including piping and ductwork prior to test.
 2. Exposed rough metal work shall be carefully brushed down with steel brushes to remove rust and other spots and left in clean condition to receive painter's finish. Where factory prime coat has been damaged, this Contractor shall be responsible for restoration of same.
 - 1.23 ACCESS PANELS
 - A. Access Doors and Panels:
 1. Wherever volume dampers, fire dampers, smoke fire dampers, controls, valves or other items or parts of the installation which require periodic inspection or adjustments are concealed by permanent non-removable construction, an access door shall be provided. Rating of access panel shall be determined by rating of wall or ceiling in which panel is installed. Types to be as approved and as appropriate for the surface and construction in which it is installed. Verify all locations with Architect and other trades.
 2. Access doors and panels shall be of sufficient size and shall be located properly to assure service to the intended item.
 - 1.24 MAINTENANCE, OPERATION INSTRUCTION
 - A. General: Thoroughly instruct the Owner's operators in every detail of operation of the system. Provide the Owner with a list of all equipment, giving the manufacturer's name, model number, serial number, parts list and complete internal wiring diagrams. All directions for operation furnished by the manufacturer shall be carefully saved and turned over to the Owner, together with written sequence of operation, operating and maintenance instructions for each system and its equipment. Instruction shall consist of a minimum of four 8-hour periods over consecutive days and shall be 30% classroom and 70% at site location. Coordinate scheduling of instruction times with Owner's operators.
 - B. Specific Data: Submit four complete sets of the following data to the Owner for approval and commissioning agent for review prior to acceptance of the installation, complete and at one time; (partial or separate data will not be accepted) data shall consist of the following:
 1. Valve Directory: Indicating valve number, location, function and normal operating position for each.

2. Color code schedule.
 3. Equipment: List of name plates, including name plate data.
 4. Manufacturer's Literature: Copies of manufacturer's instructions for operation and maintenance of all mechanical equipment, including replacement parts lists and drawings. Mark or highlight brochure literature indicating the models, sizes, capacities, curve operating points, etc., in a manner to clearly indicate the equipment installed. Remove all pages or sheets from the bulletin and catalogs that do not pertain to equipment installed on the project.
 5. Written Instructions: Typewritten instructions for operation and maintenance of the system composed of OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS and a MAINTENANCE SCHEDULE.
 - a. OPERATING INSTRUCTIONS shall contain a brief description of the system. Adjustments requiring the technical knowledge of the service agency personnel shall not be included in the operating instructions. The fact such adjustments are required, however, shall be noted.
 - b. MAINTENANCE INSTRUCTIONS shall list each item of equipment requiring inspection, lubrication or service and describe the performance of such maintenance.
 - c. MAINTENANCE SCHEDULE shall list each item of equipment requiring maintenance, shall show the exact type of maintenance on every component of each item of equipment, and shall show when each item of equipment should be inspected or services.
 6. Instructions: Operating personnel shall be instructed in the operation of the system in accordance with typewritten, approved instructions.
- C. Binders: Provide complete sets of the above data in loose-leaf ring-type binders with permanent covers, with identification on front and on spine.
- 1.25 SPECIAL REQUIREMENTS
- A. During the guarantee period and as directed by the Owner, make any additional tests, adjustment, etc., that may be required and correct any defects or deficiencies arising from operation of the systems. Operational tests shall be made during both heating and cooling seasons and on all systems.
 - B. Completion:
 1. The entire mechanical system shall be commissioned in accordance with ASHRAE Guideline 1-1996 and the requirements of this specification. A final commissioning report shall be approved by the Owner, Architect, and Mechanical Engineer prior to final acceptance of the work.
 2. When the installation is complete and adjustments specified herein have been made, the system, shall be operated for a period of one week, during which time it shall be demonstrated to the Owner or his representative as being completed and operating in conformance with these specifications. The Contractor shall schedule all work so that this time period, which is to confirm a "bug-free" system, will occur before the total project is accepted for substantial completion by Owner.
 3. The work hereunder shall not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, valve directories, piping identification code directory, and nameplates specified herein have been approved and properly posted in the building.
- 1.26 WARRANTY/GUARANTEE
- A. The contractor shall warranty/guarantee that materials, apparatus, and equipment furnished and installed under the mechanical division of these specifications shall be new and free from all defects. Should any defects develop, within one year (unless a longer period is listed in other sections of the specifications) from the date of final acceptance by the owner or from the date of certificate of substantial completion, whichever is earlier, due to inferior or faulty materials and/or workmanship, the trouble shall be corrected by this Contractor without expense to the Owner. Any defective materials or inferior workmanship noticed at the time of installation or

during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.

- B. The work shall be installed of such materials and in such a manner that:
1. The operation of all parts of the system shall be noiseless to the extent that no objectionable sound of operation will be heard outside of the rooms enclosing the apparatus or equipment.
 2. Apparatus or equipment shall operate in accordance with detailed specifications covering each item.
 3. Contractor shall, at his own expense, make any adjustments or changes required to produce a condition of quietness satisfactory to the Engineer or his representative. Such adjustments or changes shall not reduce the performance or quantities called for on the drawings.
 4. Contractor shall guarantee that his installation of all materials and equipment will meet the performance requirements of these specifications and that all equipment will deliver the specified or required capacities.
 5. The Owner reserves the right to make temporary or emergency repairs as necessary to keep equipment in operating condition without voiding the guarantee contained herein nor relieving the Contractor of his responsibilities during the guarantee period.
 6. Contractor shall be responsible for all damage to any part of the premises caused by leaks or break in pipe lines, fixtures or equipment furnished and installed under his contract for a period of one year after date of acceptance of the project by Owner. He shall replace in kind, at his own expense, any and all items so damaged to the complete satisfaction of the Owner.

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BASIC MECHANICAL MATERIALS AND METHODS

Section 23 00 50

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete base construction requirements.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Flexible connectors.
 - 6. Mechanical sleeve seals.
 - 7. Equipment nameplate data requirements.
 - 8. Labeling and identifying mechanical systems and equipment is specified in Division 23 Section "Identification for HVAC Piping and Equipment."
 - 9. Nonshrink grout for equipment installations.
 - 10. Field-fabricated metal and wood equipment supports.
 - 11. Installation requirements common to equipment specification sections.
 - 12. Cutting and patching.
 - 13. Touchup painting and finishing.
- B. Pipe and pipe fitting materials are specified in Division 23 piping system Sections.
- C. Related Sections include the following:
 - 1. Division 1 Section "LEED Requirements".

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for rubber materials:
 - 1. CR: Chlorosulfonated polyethylene synthetic rubber.
 - 2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- D. Coordination Drawings: For access panel and door locations.
- E. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building

components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:

1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
4. Equipment and accessory service connections and support details.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and location of required concrete pads and bases.
8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
10. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.

- F. Samples: Of color, lettering style, and other graphic representation required for each identification material and device.

1.5 QUALITY ASSURANCE

- A. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section.
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Dielectric Unions:
 - a. Epco Sales Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Industries, Inc.; Wilkins Div.
 2. Dielectric Flanges:
 - a. Epco Sales Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 3. Dielectric-Flange Insulating Kits:
 - a. Calpico, Inc.
 - b. Central Plastics Co.
 4. Dielectric Couplings:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
 5. Dielectric Nipples:
 - a. Grinnell Corp.; Grinnell Supply Sales Co.
 - b. Victaulic Co. of America.
 6. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.
B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
E. Solder Filler Metals: ASTM B 32.
 1. Alloy E: Approximately 95 percent tin and 5 percent antimony, lead free.
- F. Brazing Filler Metals: AWS A5.8.
 1. BCuP Series: Copper-phosphorus alloys.
 2. BAg1: Silver alloy.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
H. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
I. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
 1. Sleeve: ASTM A 126, Class B, gray iron.
 2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
 3. Gaskets: Rubber.
 4. Bolts and Nuts: AWWA C111.
 5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.
- G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.6 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 - 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with setscrews.
 - 5. PE: Manufactured, reusable, tapered, cup shaped, smooth outer surface, with nailing flange for attaching to wooden forms.
- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
 - 1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 - 2. OD: Completely cover opening.
 - 3. Cast Brass: Split casting, with concealed hinge and set screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome-plate.
 - 4. Stamped Steel: One piece, with spring clips and chrome-plated finish.
 - 5. Stamped Steel: Split plate, with concealed hinge, spring clips, and chrome-plated finish.
 - 6. Cast-Iron Floor Plate: One-piece casting.

2.7 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
 - 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psig, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 23 piping Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 - 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.
 - 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
 - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 - 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Permanent sleeves are not required for holes formed by PE removable sleeves.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Build sleeves into walls and slabs as work progresses.
 - 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Sections for flashing.
 - 1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Sections for materials.
 - 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

- Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches in diameter and larger.
 3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Sections for materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
 4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
- W. Piping Connections: Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
 2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.
- G. Contractor to ensure that all exposed equipment and ductwork is free of debris and dust once the building is handed over to the Owner.

3.3 PAINTING AND FINISHING

- A. Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.
- B. Apply paint to exposed piping according to the following, unless otherwise indicated:
 1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
 4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
 5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
 6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
- C. Paint visible sheet metal behind ceiling inlets and outlets flat black.
- D. Do not paint piping specialties with factory-applied finish.
- E. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.7 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.
- C. Patching of cut areas should not be done in a manner that may diminish the finish product.

3.8 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's written instructions.

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COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

Section 23 05 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes basic requirements for factory-installed motors.
- B. Related sections include the following:
 - 1. Division 01 Sustainable Design Requirements – LEED Sections.

1.3 DEFINITIONS

- A. **Factory-Installed Motor:** A motor installed by motorized-equipment manufacturer as a component of equipment.
- B. **Field-Installed Motor:** A motor installed at Project site and not factory installed as an integral component of motorized equipment.

1.4 SUBMITTALS

- A. **Manufacturer Seismic Qualification Certification:** Submit certification that motors, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment. Include the following:
 - 1. **Basis for Certification:** Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - 2. **Dimensioned Outline Drawings of Equipment Unit:** Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. **Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.**
- B. **LEED Submittals:** Provide cost data breakdown, recycle content and manufacturer.
- C. **Qualification Data:** For testing agency.
- D. **Source quality-control test reports.**
- E. **Field quality-control test reports.**

1.5 QUALITY ASSURANCE

- A. **Testing Agency Qualifications:** An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. **Testing Agency's Field Supervisor:** Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. **Source Limitations:** Obtain field-installed motors through one source from a single manufacturer.
- C. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. **Comply with NFPA 70.**

1.6 COORDINATION

- A. **Coordinate features of motors, installed units, and accessory devices and features that comply with the following:**
 - 1. **Compatible with the following:**
 - a. Magnetic controllers.
 - b. Multi-speed controllers.
 - c. Reduced-voltage controllers.

2. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
 3. Matched to torque and horsepower requirements of the load.
 4. Matched to ratings and characteristics of supply circuit and required control sequence.
- B. Coordinate motor support with requirements for driven load; access for maintenance and motor replacement; installation of accessories, belts, belt guards; and adjustment of sliding rails for belt tensioning.
- C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 MOTOR REQUIREMENTS

- A. Motor requirements apply to factory-and field-installed motors except as follows:
1. Different ratings, performance, or characteristics for motor are specified in another Section.
 2. Motorized-equipment manufacturer requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.

2.2 MOTOR CHARACTERISTICS

- A. Motors 1/2 HP and Larger: Three phase.
- B. Motors Smaller Than 1/2 HP: Single phase.
- C. Frequency Rating: 60 Hz.
- D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
- E. Service Factor: 1.15 for open drip-proof motors; 1.0 for totally enclosed motors.
- F. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
- G. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- H. Enclosure: Open drip-proof or totally enclosed.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium, as defined in NEMA MG 1.
- C. Stator: Copper windings, unless otherwise indicated.
1. Multi-speed motors shall have separate winding for each speed.
- D. Rotor: Squirrel cage, unless otherwise indicated.
- E. Bearings: Double-shielded, prelubricated ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Match insulation rating, unless otherwise indicated.
- G. Insulation: Class F, unless otherwise indicated.
- H. Code Letter Designation:
1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp.
1. Finish: Gray enamel.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Inrush Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
1. Designed with critical vibration frequencies outside operating range of controller output.
 2. Temperature Rise: Matched to rating for Class B insulation.
 3. Insulation: Class H.
 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

- A. Type: One of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split-phase start, capacitor run.
 - 3. Capacitor start, capacitor run.
- B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.
- C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.
- D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for conduit systems to verify actual locations of conduit connections before motor installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

Section 23 05 17

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Sleeve-seal fittings.
 - 5. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - 1. Smith, Jay R. Mfg. Co.
 - 2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
- B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. Metraflex Company (The).
 - 4. Pipeline Seal and Insulator, Inc.
 - 5. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, or Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by the following:
 - 1. Presealed Systems.
- B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 92 00 "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 84 13 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 - 1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 - 2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
 - 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.
 - 4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 5. Using grout, seal the space around outside of stack-sleeve fittings.
- B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 84 13 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6 (DN 150) Sleeve-seal fittings.
 - b. Piping NPS 6 (DN 150) and Larger: Cast-iron wall sleeves, Galvanized-steel wall sleeves or Galvanized-steel-pipe sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, or Galvanized-steel-pipe sleeves with sleeve-seal system Sleeve-seal fittings.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 (DN 150) and Larger: Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, or Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves with sleeve-seal system, or Sleeve-seal fittings.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 (DN 150) and Larger: Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves with sleeve-seal system, or Galvanized-steel-pipe sleeves.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6 (DN 150): Stack-sleeve fittings or Sleeve-seal fittings.
 - b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-pipe sleeves Stack-sleeve fittings.
 - 5. Interior Partitions:
 - a. Piping Smaller Than NPS 6 (DN 150): Galvanized-steel-pipe sleeves.
 - b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-sheet sleeves.

Verify, with fire authorities having jurisdiction, that PVC materials are allowed for sleeves.

* * *

ESCUTCHEONS FOR HVAC PIPING

Section 23 05 18

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- D. Split-Casting Brass Type: With polished, chrome-plated and rough-brass finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed and exposed-riquet hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-riquet hinge.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-riquet hinge.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-riquet hinge.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-riquet hinge.

- j. Bare Piping in Equipment Rooms: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
- k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge or split-plate, stamped-steel type with exposed-rivet hinge.
- 2. Escutcheons for Existing Piping:
 - a. Chrome-Plated Piping: Split-casting brass type with polished, chrome-plated finish.
 - b. Insulated Piping: Split-plate, stamped-steel type with concealed or exposed-rivet hinge.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed or exposed-rivet hinge.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed or exposed-rivet hinge.
 - g. Bare Piping in Unfinished Service Spaces: Split-casting brass type with polished, chrome-plated finish.
 - h. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed or exposed-rivet hinge.
 - i. Bare Piping in Equipment Rooms: Split-casting brass type with polished, chrome-plated finish.
 - j. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with concealed or exposed-rivet hinge.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.
- 3.2 FIELD QUALITY CONTROL
 - A. Replace broken and damaged escutcheons and floor plates using new materials.

* * *

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

Section 23 05 29

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following hangers and supports for mechanical system piping and equipment:
 1. Steel pipe hangers and supports.
 2. Trapeze pipe hangers.
 3. Metal framing systems.
 4. Thermal-hanger shield inserts.
 5. Fastener systems.
 6. Pipe stands.
 7. Pipe positioning systems.
 8. Equipment supports.
- B. Related Sections include the following:
 1. Division 01 Sustainable Design Requirements – LEED Sections.
 2. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 3. Division 21 Section "Wet-Pipe Sprinkler Systems" for pipe hangers for fire-protection piping.
 4. Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
 5. Division 23 Section "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
 6. Division 23 Section "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

- A. Product Data: For the following:
 1. Steel pipe hangers and supports.
 2. Thermal-hanger shield inserts.
 3. Powder-actuated fastener systems.
 4. Pipe positioning systems.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.

- C. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Pipe stands. Include Product Data for components.
 - 4. Equipment supports.
 - D. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.
 - E. Welding Certificates.
- 1.6 QUALITY ASSURANCE
- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel".
 - B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. ERICO/Michigan Hanger Co.
 - 3. Grinnell Corp.
 - 4. National Pipe Hanger Corporation.
 - 5. PHD Manufacturing, Inc.
 - 6. PHS Industries, Inc.
 - 7. Piping Technology and Products, Inc.
 - 8. Tolco, Inc.
- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
 - 3. Power-Strut Div.; Tyco International, Ltd.
 - 4. Unistrut Corp.; Tyco International, Ltd.
 - 5. Thomas & Betts Corporation
 - 6. Tolco, Inc.
- C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

- 2.5 THERMAL-HANGER SHIELD INSERTS
- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
 - B. Manufacturers:
 - 1. ERICO/Michigan Hanger Co.
 - 2. Pipe Shields, Inc.
 - 3. Rilco Manufacturing Company, Inc.
 - C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.
 - D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.
 - E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
 - F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
 - G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.
- 2.6 FASTENER SYSTEMS
- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head.
 - c. Masterset Fastening Systems, Inc.
 - B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. B-Line Systems, Inc.; a division of Cooper Industries.
 - b. Hilti, Inc.
 - c. ITW Ramset/Red Head.
- 2.7 PIPE STAND FABRICATION
- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
 - B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. MIRO Industries.
 - D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
 - 2. Base: Plastic.
 - 3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - 4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
 - E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

1. Manufacturers:
 - a. Portable Pipe Hangers.
 2. Bases: One or more plastic.
 3. Vertical Members: Two or more protective-coated-steel channels.
 4. Horizontal Member: Protective-coated-steel channel.
 5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
- F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.
- 2.8 PIPE POSITIONING SYSTEMS
- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
- B. Manufacturers:
 1. C & S Mfg. Corp.
 2. HOLDRITE Corp.; Hubbard Enterprises.
 3. Samco Stamping, Inc.
- 2.9 EQUIPMENT SUPPORTS
- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.
- 2.10 MISCELLANEOUS MATERIALS
- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 6. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.

9. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
 10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
 11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
 12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
 17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

- N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
 - O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.
- 3.2 HANGER AND SUPPORT INSTALLATION
- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
 - B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
 - C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
 - D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
 - E. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
 - F. Pipe Stand Installation:
 - 1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - 2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Sections for roof accessories and curbs.
 - G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Sections for plumbing fixtures.
 - H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
 - I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
 - J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
 - K. Install lateral bracing with pipe hangers and supports to prevent swaying.
 - L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
 - M. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
 - N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
 - O. Insulated Piping: Comply with the following:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

- b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 5. Pipes NPS 8 and Larger: Include wood inserts.
 - 6. Insert Material: Length at least as long as protective shield.
 - 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- 3.3 EQUIPMENT SUPPORTS
- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
 - B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
 - C. Provide lateral bracing, to prevent swaying, for equipment supports.
- 3.4 METAL FABRICATIONS
- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
 - B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
 - C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.
- 3.5 ADJUSTING
- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
 - B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.
- 3.6 PAINTING
- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
 - B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
 - C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

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VIBRATION AND SEISMIC CONTROLS Section 23 05 48 FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 1. Restrained elastomeric isolation mounts.
 2. Restrained spring isolators.
 3. Housed spring mounts.
 4. Restrained vibration isolation roof-curb rails.
 5. Restraining cables.
 6. Steel vibration isolation equipment bases.
- B. Related sections include the following:
 1. Division 01 Sustainable Design Requirements – LEED Sections.

1.3 DEFINITIONS

- A. A: Effective peak velocity related acceleration coefficient.
- B. OSHPD: Office of Statewide Health Planning & Development for the State of California. OSHPD assigns a unique anchorage preapproval "R" number to each seismic restraint it tests. The number describes a specific device applied as tested.

1.4 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:
 1. Basic Wind Speed: 85 MPH.
 2. Building Classification Category: II.
 3. Minimum 10 lb/sq. ft. multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.
- B. Seismic-Restraint Loading:
 1. Site Class as Defined in the IBC: D.
 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: 2.5.
 - c. Component Amplification Factor: 2.5.
 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 0.374g.
 4. Design Spectral Response Acceleration at 1-Second Period: 0.867g.

1.5 SUBMITTALS

- A. Product Data: Include load deflection curves for each vibration isolation device.
- B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators, seismic restraints, and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Division 23 Sections for equipment mounted outdoors.
 2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure,

- spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.
3. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
 4. Seismic Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Division 23 Sections for equipment mounted outdoors.
 - d. Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
- C. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- D. Shop Drawings: Signed and sealed by a qualified professional engineer. Include the following:
1. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 2. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
 3. Seismic-Restraint Details: Detail fabrication and attachment of seismic restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.
- E. Welding certificates.
- F. Manufacturer Seismic Qualification Certification: Submit certification that all specified equipment will withstand seismic forces identified in "Performance Requirements" Article above. Include the following:
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified. In addition, units field wired to an emergency power source unit will be fully operational after the seismic event.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.6 QUALITY ASSURANCE

- A. Seismic-restraint devices shall have horizontal and vertical load testing and analysis performed according to OSHPD and shall bear anchorage preapproval "R" number, from OSHPD or another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on

independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer. Testing and calculations must include both shear and tensile loads and 1 test or analysis at 45 degrees to the weakest mode.

- B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Seismic Snubber Units: Furnish replacement neoprene inserts for all snubbers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VIBRATION ISOLATORS

- A. Manufacturers:
 - 1. Amber/Booth Company, Inc.
 - 2. Mason Industries, Inc.
 - 3. Vibration Mountings & Controls/Korfund.
- B. Restrained Elastomeric Mounts: All-directional elastomeric mountings with seismic restraint.
 - 1. Materials: Cast-ductile-iron housing containing two separate and opposing, molded, bridge-bearing neoprene elements that prevent central threaded sleeve and attachment bolt from contacting the casting during normal operation.
 - 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
- C. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
- D. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.
 - 1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
 - 2. Base: Factory drilled for bolting to structure.
 - 3. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch travel before contacting a resilient collar.

2.3 RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS

- A. Manufacturers:
 - 1. Amber/Booth Company, Inc.

2. Mason Industries, Inc.
3. Vibration Mountings & Controls/Korfund.
- B. Description: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand 125-mph wind impinging laterally against side of equipment.
- C. Lower Support Assembly: Sheet-metal "Z" section containing adjustable and removable steel springs that support upper floating frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist wind and seismic forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches of rigid, glass-fiber insulation on inside of assembly.
- D. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4-inch thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.
 1. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - a. Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 2. Elastomeric Isolator Pads: Oil and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirement of supported equipment.
 - a. Material: Standard neoprene.
 - b. Durometer Rating: 60.
 - c. Number of Layers: 2.
- E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch thick.
- F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

2.4 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers:
 1. Amber/Booth Company, Inc.
 2. Mason Industries, Inc.
 3. Vibration Mountings & Controls/Korfund.
- B. Resilient Isolation Washers and Bushings: 1-piece, molded, bridge-bearing neoprene complying with AASHTO M 251 and having a durometer of 50, plus or minus 5, with a flat washer face.
- C. Restraining Cables: Galvanized steel aircraft cables with end connections made of steel assemblies that swivel to final installation angle and utilize two clamping bolts for cable engagement.
- D. Anchor Bolts: Seismic-rated, drill-in, and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488/E 488M.

2.5 VIBRATION ISOLATION EQUIPMENT BASES

- A. Manufacturers:
 - 1. Amber/Booth Company, Inc.
 - 2. Mason Industries, Inc.
 - 3. Vibration Mountings & Controls/Korfund.
- B. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
 - 1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails. Include supports for suction and discharge elbows for pumps.
 - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - 3. Support Brackets: Factory-welded steel angles on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

2.6 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be electrogalvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements, installation tolerances, and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install equipment supports, and roof penetrations as specified.
- B. Install restraining cables at each trapeze and individual pipe hanger. At trapeze anchor locations, shackle piping to trapeze. Install cables so they do not bend across sharp edges of adjacent equipment or building structure.
- C. Install steel angles or channel, sized to prevent buckling, clamped with ductile-iron clamps to hanger rods for trapeze and individual pipe hangers. At trapeze anchor locations, shackle piping to trapeze. Requirements apply equally to hanging equipment. Do not weld angles to rods.
- D. Install resilient bolt isolation washers on equipment anchor bolts.

3.3 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing:
 - 1. Isolator seismic-restraint clearance.
 - 2. Isolator deflection.

3.4 ADJUSTING

- A. Adjust isolators after piping systems have been filled and equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

- C. Adjust active height of spring isolators.
- D. Adjust seismic restraints to permit free movement of equipment within normal mode of operation.
- E. Torque anchor bolts according to equipment manufacturer's written recommendations to resist seismic forces.

3.5 CLEANING

- A. After completing equipment installation, inspect vibration isolation and seismic-control devices. Remove paint splatters and other spots, dirt, and debris.

* * *

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

Section 23 05 53

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes mechanical identification materials and devices.

1.3 SUBMITTALS

- A. Product Data: For identification materials and devices.
- B. Samples: Of color, lettering style, and graphic representation required for each identification material and device.
- C. Valve Schedules: For each piping system. Reproduce on standard-size bond paper. Tabulate valve number, piping system, system abbreviation as shown on tag, room or space location of valve, and variations for identification. Mark valves intended for emergency shutoff and similar special uses. Besides mounted copies, furnish copies for maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

- A. General: Products specified are for applications referenced in other Division 23 Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - 2. Location: Accessible and visible.
- C. Stencils: Standard stencils, prepared with letter sizes conforming to recommendations of ASME A13.1. Minimum letter height is 1-1/4 inches for ducts, and 3/4 inch for access door signs and similar operational instructions.
 - 1. Material: Fiberboard.
 - 2. Material: Brass.
 - 3. Stencil Paint: Exterior, oil-based, alkyd gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.
 - 4. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.
- D. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive, vinyl type with permanent adhesive.
- F. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- G. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.

- H. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - 1. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.
- I. Plastic Duct Markers: Manufacturer's standard laminated plastic, in the following color codes:
 - 1. Green: Cold-air supply.
 - 2. Blue: Exhaust, return, and mixed air.
 - 3. Hazardous Material Exhausts: Use colors and designs recommended by ASME A13.1.
 - 4. Terminology: Include direction of airflow; duct service such as supply, return, and exhaust; duct origin, duct destination, and design flow.
- J. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils thick.
 - 1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
 - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- K. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch- thick, polished brass.
 - 2. Material: 3/32-inch- thick plastic laminate with 2 black surfaces and a white inner layer.
 - 3. Material: Valve manufacturer's standard solid plastic.
 - 4. Size: 1-1/2-inches diameter, unless otherwise indicated.
 - 5. Shape: As indicated for each piping system.
- L. Valve Tag Fasteners: Brass, wire-link chain; beaded chain; or S-hooks.
- M. Access Panel Markers: 1/16-inch- thick, engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve. Provide 1/8-inch center hole for attachment.
- N. Valve Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include screws.
 - 1. Frame: Finished hardwood.
 - 2. Frame: Extruded aluminum.
 - 3. Glazing: ASTM C 1036, Type I, Class 1, Glazing quality B, 2.5-mm, single-thickness glass.
- O. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 2. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
 - 3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- P. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.
 - 3. Blue: Equipment and components that do not meet criteria above.
 - 4. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
 - 5. Terminology: Match schedules as closely as possible. Include the following:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.

- d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
- 6. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- Q. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.
 - 1. Size: 3-1/4 by 5-5/8 inches.
 - 2. Fasteners: Brass grommets and wire.
 - 3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
- R. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.
 - 1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING PIPING SYSTEMS

- A. Install pipe markers on each system. Include arrows showing normal direction of flow.
- B. Marker Type: Stenciled markers complying with ASME A13.1.
- C. Marker Type: Plastic markers, with application systems. Install on pipe insulation segment where required for hot, noninsulated pipes.
- D. Fasten markers on pipes and insulated pipes smaller than 6 inches OD by one of following methods:
 - 1. Snap-on application of pretensioned, semirigid plastic pipe marker.
 - 2. Adhesive lap joint in pipe marker overlap.
 - 3. Laminated or bonded application of pipe marker to pipe or insulation.
 - 4. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 3/4 inch wide, lapped a minimum of 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
- E. Fasten markers on pipes and insulated pipes 6 inches in diameter and larger by one of following methods:
 - 1. Laminated or bonded application of pipe marker to pipe or insulation.
 - 2. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 1-1/2 inches wide, lapped a minimum of 3 inches at both ends of pipe marker, and covering full circumference of pipe.
 - 3. Strapped to pipe or insulation with manufacturer's standard stainless-steel bands.
- F. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
 - 3. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at a maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.2 VALVE TAGS

- A. Install on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule.
- B. Tag Material: Brass.
- C. Tag Material: Plastic.
- D. Tag Size and Shape: According to the following:
 - 1. Cold Water: 2 inches, round.
 - 2. Cold Water: 1-1/2 inches, square.
 - 3. Hot Water: 2 inches, round.
 - 4. Hot Water: 1-1/2 inches, square.
 - 5. Gas: 2 inches, round.
 - 6. Gas: 1-1/2 inches, square.
 - 7. Heating Hot Water: 2 inches, round.
 - 8. Heating Hot Water: 1-1/2 inches, square.
- E. Tag Color: According to the following:
 - 1. Cold Water: Blue.
 - 2. Hot Water: Green.
 - 3. Gas: Yellow.
 - 4. Heating Hot Water: Green.
- F. Letter Color: According to the following:
 - 1. Cold Water: Black.
 - 2. Hot Water: Black.
 - 3. Gas: Black.
 - 4. Heating Hot Water: Black.
- G. Install mounted valve schedule in each major equipment room.

3.3 EQUIPMENT SIGNS AND MARKERS

- A. Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment. Include signs for the following general categories of equipment:
 - 1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
 - 2. Fire department hose valves and hose stations.
 - 3. Meters, gages, thermometers, and similar units.
 - 4. Fuel-burning units, including boilers, and heaters.
 - 5. Pumps and similar motor-driven units.
 - 6. Coils, evaporators, and similar equipment.
 - 7. Fans, blowers, primary balancing dampers, and mixing boxes.
 - 8. Packaged central-station air handling units and zone-type units.
 - 9. Tanks and pressure vessels.
 - 10. Strainers, filters, water-treatment systems, and similar equipment.
- B. Optional Sign Types: Stenciled signs may be provided instead of engraved plastic, at Installer's option, where lettering larger than 1-inch high is needed for proper identification because of distance from normal location of required identification.
 - 1. Lettering Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 2. Terms on Signs: Distinguish between multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.

- C. Plasticized Tags: Install within concealed space, to reduce amount of text in exposed sign outside concealment, if equipment to be identified is concealed above acoustical ceiling or similar concealment.
 - 1. Identify operational valves and similar minor equipment items located in unoccupied spaces, including machine rooms, by installing plasticized tags.
 - D. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows showing service and direction of flow.
 - 1. Location: Locate signs near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.
- 3.4 ADJUSTING AND CLEANING
- A. Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.
 - B. Clean faces of identification devices and glass frames of valve charts.

* * *

TESTING, ADJUSTING AND BALANCING Section 23 05 93 FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
 - 1. Balancing airflow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
 - 2. Adjusting total HVAC systems to provide indicated quantities.
 - 3. Measuring electrical performance of HVAC equipment.
 - 4. Setting quantitative performance of HVAC equipment.
 - 5. Verifying that automatic control devices are functioning properly.
 - 6. Measuring sound and vibration.
 - 7. Reporting results of the activities and procedures specified in this Section.
- B. Related Sections include the following:
 - 1. Division 01 Sustainable Design Requirements – LEED Sections.
 - 2. Division 01 Section 01 91 00 "General Commissioning Requirements."
 - 3. Division 23 Section 23 08 00 "Commissioning of HVAC Systems."
 - 4. Testing and adjusting requirements unique to particular systems and equipment are included in the Sections that specify those systems and equipment.
 - 5. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment Sections.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- E. Report Forms: Test data sheets for recording test data in logical order.
- F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- H. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- K. Test: A procedure to determine quantitative performance of a system or equipment.
- L. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.
- M. AABC: Associated Air Balance Council.
- N. AMCA: Air Movement and Control Association.
- O. CTI: Cooling Tower Institute.

- P. NEBB: National Environmental Balancing Bureau.
- Q. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.4 SUBMITTALS

- A. Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit 2 copies of the Contract Documents review report as specified in Part 3 of this Section.
- D. Strategies and Procedures Plan: Within 60 days from the Contractor's Notice to Proceed, submit 2 copies of the testing, adjusting, and balancing strategies and step-by-step procedures as specified in Part 3 "Preparation" Article below. Include a complete set of report forms intended for use on this Project.
- E. Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- F. Sample Report Forms: Submit 2 sets of sample testing, adjusting, and balancing report forms.
- G. Warranty: Submit 2 copies of special warranty specified in the "Warranty" Article below.

1.5 QUALITY ASSURANCE

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by either AABC or NEBB.
- B. Testing, Adjusting, and Balancing Conference: Meet with the Owner's and the Architect's representatives on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 7 days' advance notice of scheduled meeting time and location.
 - 1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.
 - b. Contract Documents examination report.
 - c. Testing, adjusting, and balancing plan.
 - d. Work schedule and Project site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.
 - f. Coordination of documentation and communication flow.
- C. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
 - 2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.
- D. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."
- E. Testing, Adjusting, and Balancing Reports: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- F. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards.
- G. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- H. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.6 PROJECT CONDITIONS

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

1.7 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air distribution systems have been satisfactorily completed.

1.8 WARRANTY

- A. General Warranty: The national project performance guarantee specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. National Project Performance (or special) Guarantee: Provide a guarantee on AABC'S "National Standards" (or NEBB) forms stating that AABC (or NEBB) will assist in completing the requirements of the Contract Documents if the testing, adjusting, and balancing Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:
 - 1. The certified Agent has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
 - 1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine project record documents described in Division 01 Section for Project Record Documents.
- D. Examine Architect's and Engineer's design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data, including fan and pump curves. Relate performance data to project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's

"HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

- F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
- G. Examine system and equipment test reports.
- H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine fan coil units to verify that they are accessible and their controls are connected and functioning.
- L. Examine plenums, utilized for outside air, to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine equipment for installation and for properly operating safety interlocks and controls.
- O. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices operate by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions.
 - 4. Automatic modulating and shutoff valves are properly connected.
 - 5. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 6. Sensors are located to sense only the intended conditions.
 - 7. Sequence of operation for control modes is according to the Contract Documents.
 - 8. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
 - 9. Interlocked systems are operating.
 - 10. Changeover from heating to cooling mode occurs according to design values.
- P. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

3.2 PREPARATION

- A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
 - 1. Permanent electrical power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Isolating and balancing valves are open and control valves are operational.
 - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 7. Windows and doors can be closed so design conditions for system operations can be met.

3.3 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards (or NEBB's Procedural Standards for Testing Adjusting, and Balancing of Environmental Systems") and this Section.
- B. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- C. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- D. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.4 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check the airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.

3.5 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

- A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems. Additional procedures are required for variable-air-volume, and process exhaust-air systems. These additional procedures are specified in other articles in this Section.
- B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.
 - 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 2. Measure static pressure across each air-handling unit component.
 - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
 - 3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers under final balanced conditions.
 - 4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with

- calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
5. Adjust fan speed higher or lower than design with the approval of the Architect. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.
- C. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.
- D. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.
- E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.
1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer, model, and serial numbers.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating if high-efficiency motor.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.7 TEMPERATURE TESTING

- A. During testing, adjusting, and balancing, report need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of 2 successive 8-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

3.8 TEMPERATURE-CONTROL VERIFICATION

- A. Verify that controllers are calibrated and commissioned.
- B. Check transmitter and controller locations and note conditions that would adversely affect control functions.
- C. Record controller settings and note variances between set points and actual measurements.

- D. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).
- E. Verify free travel and proper operation of control devices such as damper and valve operators.
- F. Verify sequence of operation of control devices. Note air pressures and device positions and correlate with airflow measurements. Note the speed of response to input changes.
- G. Confirm interaction of electrically operated switch transducers.
- H. Confirm interaction of interlock and lockout systems.
- I. Verify main control supply-air pressure and observe compressor and dryer operations.
- J. Record voltages of power supply and controller output. Determine if the system operates on a grounded or nongrounded power supply.
- K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.9 TOLERANCES

- A. Set HVAC system airflow rates within the following tolerances:
 - 1. Supply, Return and Exhaust Fans: Plus 5 to plus 10 percent.
 - 2. Air Outlets and Inlets: 0 to minus 10 percent.

3.10 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article above, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of the instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to the certified field report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
 - 1. Title page.
 - 2. Name and address of testing, adjusting, and balancing Agent.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of testing, adjusting, and balancing Agent who certifies the report.
 - 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.

- c. Description of system operation sequence if it varies from the Contract Documents.
11. Nomenclature sheets for each item of equipment.
12. Data for terminal units, including manufacturer, type size, and fittings.
13. Notes to explain why certain final data in the body of reports vary from design values.
14. Test conditions for fans and pump performance forms, including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - f. Variable speed drive settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air distribution systems. Present with single-line diagrams and include the following:
 1. Quantities of outside, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Pipe and valve sizes and locations.
 4. Balancing stations.
- F. Air-Handling Unit Test Reports: For air-handling and fan coil units with coils, include the following:
 1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Sheave dimensions, center-to-center and amount of adjustments in inches.
 - j. Number of belts, make, and size.
 - k. Number of filters, type, and size.
 2. Motor Data: Include the following:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center and amount of adjustments in inches.
 3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Cooling coil static-pressure differential in inches wg.
 - g. Heating coil static-pressure differential in inches wg.
 - h. Outside airflow in cfm.
 - i. Return airflow in cfm.

- j. Outside-air damper position.
 - k. Return-air damper position.
 - G. Fan Test Reports: For supply and exhaust fans, include the following:
 - 1. Fan Data: Include the following:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Sheave dimensions, center-to-center and amount of adjustments in inches.
 - 2. Motor Data: Include the following:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center and amount of adjustments in inches.
 - g. Number of belts, make, and size.
 - 3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
 - H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data: Include the following:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Design airflow rate in cfm.
 - h. Design velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
 - I. Compressor and Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, air-cooled condensing units, include the following:
 - 1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Unit make and model number.
 - d. Manufacturer's compressor serial numbers.
 - e. Compressor make.
 - f. Compressor model and serial numbers.
 - g. Refrigerant weight in lb.
 - h. Low ambient temperature cutoff in deg F.

2. Test Data: Include design and actual values for the following:
 - a. Entering-air, dry-bulb temperature in deg F.
 - b. Leaving-air, dry-bulb temperature in deg F.
 - c. Control settings.
 - d. Unloader set points.
 - e. Low-pressure-cutout set point in psig.
 - f. High-pressure-cutout set point in psig.
 - g. Suction pressure in psig.
 - h. Suction temperature in deg F.
 - i. Condenser refrigerant pressure in psig.
 - j. Condenser refrigerant temperature in deg F.
 - k. Oil pressure in psig.
 - l. Oil temperature in deg F.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. The kW input.
 - p. Crankcase heater kW.
 - q. Number of fans.
 - r. Condenser fan rpm.
 - s. Condenser fan airflow rate in cfm.
 - t. Condenser fan motor make, frame size, rpm, and horsepower.
 - u. Condenser fan motor voltage at each connection.
 - v. Condenser fan motor amperage for each phase.
- J. Instrument Calibration Reports: For instrument calibration, include the following:
 1. Report Data: Include the following:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.12 ADDITIONAL TESTS

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

* * *

DUCT INSULATION

Section 23 07 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes semirigid and flexible duct, and plenum, insulation; insulating cements; accessories and attachments; and sealing compounds.
- B. Related Sections include the following:
 - 1. Division 01 Sustainable Design Requirements – LEED Sections.
 - 2. Division 07 Sections for firestopping materials and requirements for penetrations through fire and smoke barriers.
 - 3. Division 23 Section "HVAC Equipment Insulation" for insulation materials and application for pumps, tanks, hydronic specialties, and other equipment.
 - 4. Division 23 Insulation Sections for insulation for piping systems.
 - 5. Division 23 Section "Metal Ducts" for duct liner.

1.3 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: Show fabrication and installation details for the following:
 - 1. Removable insulation sections at access panels.
 - 2. Application of field-applied jackets.
 - 3. Applications at linkages for control devices.
- D. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.
- E. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate clearance requirements with duct Installer for insulation application.

1.7 SCHEDULING

- A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Mineral-Fiber Insulation:
 - a. CertainTeed Manson.
 - b. Knauf FiberGlass GmbH.
 - c. Owens-Corning Fiberglas Corp.
 - d. Schuller International, Inc.

2.2 INSULATION MATERIALS

- A. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

2.3 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8-oz./sq. yd.
 - 1. Tape Width: 4 inches.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
 - 2. Galvanized Steel: 0.005 inch thick.
 - 3. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.
- D. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.
 - 1. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts and plenums; and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface.

2.4 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply multiple layers of insulation with longitudinal and end seams staggered.

- E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
 - F. Keep insulation materials dry during application and finishing.
 - G. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
 - H. Apply insulation with the least number of joints practical.
 - I. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - J. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
 - K. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
 - L. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
 - 3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.
 - M. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.
 - N. Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.
 - 1. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.
 - 2. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.
 - O. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
 - 1. Seal penetrations with vapor-retarder mastic.
 - 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 - 3. Seal insulation to roof flashing with vapor-retarder mastic.
 - P. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
 - Q. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.
- 3.4 MINERAL-FIBER INSULATION APPLICATION
- A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor pins and speed washers.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches. Space 16 inches o.c. each way, and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.

- c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
- d. Do not overcompress insulation during installation.
4. Impale insulation over anchors and attach speed washers.
5. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
6. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch o.c., and cover with pressure-sensitive tape having same facing as insulation.
7. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches o.c.
8. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
9. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch-wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches o.c.
10. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.

3.5 FINISHES

- A. Glass-Cloth Jacketed Insulation: Paint insulation finished with glass-cloth jacket as specified in Division 09 Painting Sections.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.6 DUCT SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Materials and thicknesses for systems listed below are specified in schedules at the end of this Section.
- C. Insulate the following plenums and duct systems:
 1. Indoor concealed supply-, return-, and outside-air ductwork.
 2. Indoor exposed supply-, return-, and outside-air ductwork.
- D. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 1. Fibrous-glass ducts.
 2. Metal ducts with duct liner.
 3. Factory-insulated flexible ducts.
 4. Factory-insulated plenums, casings, terminal boxes, and filter boxes and sections.
 5. Flexible connectors.
 6. Vibration-control devices.
 7. Testing agency labels and stamps.
 8. Nameplates and data plates.
 9. Access panels and doors in air-distribution systems.

3.7 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

- A. Service: Round, supply-air ducts, concealed.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inches.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- B. Service: Round, return-air ducts, concealed.
 1. Material: Mineral-fiber blanket.

2. Thickness: 1 inch.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- C. Service: Rectangular, supply-air ducts, concealed.
1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inches.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- D. Service: Rectangular, return-air ducts, concealed.
1. Material: Mineral-fiber blanket.
 2. Thickness: 1 inch.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- E. Service: Round, supply-air ducts, exposed, in non-conditioned room.
1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inches.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- F. Service: Round, return-air ducts, exposed, in non-conditioned room.
1. Material: Mineral-fiber blanket.
 2. Thickness: 1 inch.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- G. Service: Rectangular, supply-air ducts, exposed, in non-conditioned room.
1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inches.
 3. Number of Layers: One.
 4. Vapor Retarder Required: Yes.
- H. Service: Rectangular, return-air ducts, exposed, in non-conditioned room.
1. Material: Mineral-fiber blanket.
 2. Thickness: 1 inch.
 3. Number of Layers: One.
 4. Vapor Retarder Required: No.

* * *

HVAC PIPING INSULATION

Section 23 07 19

PART 1 - GENERAL

RELATED DOCUMENTS

1.1

Drawings and general provisions of the Contract, including General and

A.

Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

SUMMARY

1.2

Section includes insulating the following HVAC piping systems:

A.

Condensate drain piping, indoors.

1.

Refrigerant suction and hot-gas piping, indoors and outdoors.

ACTION SUBMITTALS

1.3

Product Data: For each type of product indicated. Include thermal conductivity, water-

A.

vapor permeance thickness, and jackets (both factory and field applied if any).

LEED Submittals:

B.

Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation

1.

including printed statement of VOC content.

2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

Shop Drawings: Include plans, elevations, sections, details, and attachments to other

C.

work.

Detail application of protective shields, saddles, and inserts at hangers for each

1.

type of insulation and hanger.

INFORMATIONAL SUBMITTALS

1.4

Qualification Data: For qualified Installer.

A.

Material Test Reports: From a qualified testing agency acceptable to authorities

B.

having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

Field quality-control reports.

QUALITY ASSURANCE

1.5

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

DELIVERY, STORAGE, AND HANDLING

1.6

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

COORDINATION

1.7

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 23 05 29 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

SCHEDULING

1.8

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS
INSULATION MATERIALS

1.1

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," articles for where insulating materials shall be applied. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride
- C. content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
Products: Subject to compliance with requirements, available products that may
1. be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.
- Mineral-Fiber, Preformed Pipe Insulation:
- G. Products: Subject to compliance with requirements, provide one of the following:
1. Johns Manville; Micro-Lok.
 - a.
 - b. Knauf Insulation; 1000-Degree Pipe Insulation.
 - c. Owens Corning; Fiberglas Pipe Insulation.
 2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, without factory-applied jacket.

ADHESIVES

1.2

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- B. Products: Subject to compliance with requirements, provide one of the following:
- 1.

- a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 - d. Mon-Eco Industries, Inc.; 22-25.
- For indoor applications, adhesive shall have a VOC content of 80 g/L or less
- 2. when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION EXAMINATION

1.1

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - Verify that systems to be insulated have been tested and are free of defects.
 - 1.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

1.2

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

GENERAL INSTALLATION REQUIREMENTS

1.3

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service.
- D. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- E. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- F. Install multiple layers of insulation with longitudinal and end seams staggered.
- G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- H. Keep insulation materials dry during application and finishing.
- I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- J. Install insulation with least number of joints practical.
- K. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

O. For above-ambient services, do not install insulation to the following:

Vibration-control devices.

- 1.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

PENETRATIONS

1.4

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

Seal penetrations with flashing sealant.

- 1.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 07 84 00 "Firestopping" for firestopping and fire-resistive joint sealers.

D. Insulation Installation at Floor Penetrations:

Pipe: Install insulation continuously through floor penetrations.

- 1.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 84 00 "Firestopping."

GENERAL PIPE INSULATION INSTALLATION

1.5

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

INSTALLATION OF MINERAL-FIBER INSULATION

1.6

Insulation Installation on Straight Pipes and Tubes:

A.

Secure each layer of preformed pipe insulation to pipe with wire or bands and

1. tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

Insulation Installation on Pipe Fittings and Elbows:

B.

Install preformed sections of same material as straight segments of pipe

1. insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

FIELD-APPLIED JACKET INSTALLATION

1.7

Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and

A.

end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

FIELD QUALITY CONTROL

- 1.8 Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- A. Perform tests and inspections.
 - B. Tests and Inspections:
 - C. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by
 1. removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe for each pipe service defined in the "Piping Insulation Schedule, General" Article.All insulation applications will be considered defective Work if sample inspection
 - D. reveals noncompliance with requirements.

PIPING INSULATION SCHEDULE, GENERAL

- 1.9 Acceptable preformed pipe and tubular insulation materials and thicknesses are
- A. identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
 - B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

INDOOR PIPING INSULATION SCHEDULE

- 1.10 Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):
- A. All Pipe Sizes: Insulation shall be the following: Retain one or more of six
 1. subparagraphs below.
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.
 - B. Refrigerant Suction and Hot-Gas Piping:
 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - C. Refrigerant Suction and Hot-Gas Flexible Tubing:
 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

b. Flexible Elastomeric: 1 inch thick
OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

1.11

Refrigerant Suction and Hot-Gas Piping:

A.

All Pipe Sizes: Insulation shall be one of the following:

1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inch thick.
 - a.
 - b. Flexible Elastomeric: 1-1/2 inch thick.

Refrigerant Suction and Hot-Gas Flexible Tubing:

B.

All Pipe Sizes: Insulation shall be one of the following:

1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inch thick.
 - a.
 - b. Flexible Elastomeric: 1-1/2 inch thick.

INDOOR, FIELD-APPLIED JACKET SCHEDULE

1.12

Install jacket over insulation material. For insulation with factory-applied jacket, install

A.

the field-applied jacket over the factory-applied jacket.

If more than one material is listed, selection from materials listed is Contractor's option.

B.

Piping, Concealed:

C.

None.

1. Piping, Exposed:

D.

None.

1. OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

1.13

Install jacket over insulation material. For insulation with factory-applied jacket, install

A.

the field-applied jacket over the factory-applied jacket.

If more than one material is listed, selection from materials listed is Contractor's option.

B.

Piping, Concealed:

C.

None.

1. Piping, Exposed:

D.

PVC: 30 mils thick.

1.

* * *

COMMISSIONING OF HVAC SYSTEMS Section 23 08 00

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. HVAC commissioning description.
2. HVAC commissioning responsibilities.

B. Related Sections:

1. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC: For requirements and procedures concerning testing, adjusting, and balancing of mechanical systems.
2. Section 23 09 00 - Instrumentation and Control for HVAC: Submittal and training requirements.
3. Section 23 09 23 - Direct-Digital Control System for HVAC: Submittal, training, and programming requirements.
4. Section 23 09 53 - Pneumatic and Electric Control System for HVAC: Submittal and training requirements.
5. Section 23 33 00 - Air Duct Accessories: Product requirements for ductwork test holes.
6. Section 25 50 00 - Integrated Automation Facility Controls: Submittal, training, and programming requirements.
7. Section 26 08 00 - Commissioning of Electrical Equipment: Electrical systems commissioning requirements.
8. Section 22 08 00 - Commissioning of Plumbing Equipment: Plumbing systems commissioning requirements.

1.2 REFERENCES

A. Associated Air Balance Council:

1. AABC - AABC Commissioning Guideline.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE Guideline 1.1-2007 - The HVAC Commissioning Process.

1.3 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:

1. Testing and startup of HVAC equipment and systems.
2. Equipment and system verification checks.
3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.
4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.
5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.
6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.
8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.
9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:

1. Split system air conditioning units.
2. Mechanical ventilation fans.
3. Fire/Smoke dampers.
4. Indoor air quality.
5. Equipment sound control

6. Automatic temperature control system.
 7. Testing, Adjusting and Balancing work.
 - C. Perform seasonal function performance tests for the following equipment and systems:
 1. Split system air conditioning units
- 1.4 COMMISSIONING SUBMITTALS
- A. Section 01 91 00 - Commissioning: Requirements for commissioning submittals.
 - B. Draft Forms: Draft forms of the system verification forms and the functional performance test checklist will be produced and issued as part of the Commissioning Plan by the Commissioning Authority.
 - C. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use AABC forms or ones provided by the Commissioning Authority as guidelines.
 - D. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance. Deficiencies should be reported to the General Contractor, Owner, Architect/Engineer, and Commissioning Authority.
- 1.5 CLOSEOUT SUBMITTALS
- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
 - B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.
 - C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.
- 1.6 QUALITY ASSURANCE
- A. Perform Work in accordance with AABC Commissioning Group (ACG) Guidelines and ASHRAE Guideline 0-2005 and 1.1-2007
- 1.7 COMMISSIONING RESPONSIBILITIES
- A. Equipment or System Installer Commissioning Responsibilities:
 1. Attend commissioning meetings.
 2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.
 3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.
 4. Provide instructions and demonstrations for Owner's personnel.
 5. Ensure subcontractors perform assigned commissioning responsibilities.
 6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
 7. Develop startup and initial checkout plan using manufacturer's startup procedures and functional performance checklists for equipment and systems to be commissioned.
 8. During verification check and startup process, execute HVAC related portions of checklists for equipment and systems to be commissioned.
 9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
 10. Provide manufacturer's representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
 11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
 12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.
 13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.
 14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.

15. Provide factory supervised startup services for equipment and systems. Coordinate work with manufacturer and Commissioning Authority.
 16. Perform verification checks and startup on equipment and systems as specified.
 17. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.
 18. Perform operation and maintenance training sessions scheduled by Commissioning Authority.
 19. Conduct HVAC system orientation and inspection.
- B. Temperature Controls Installer Commissioning Responsibilities:
1. Attend commissioning meetings.
 2. Review design for ability of systems to be controlled including the following:
 - a. Confirm that all of the proper hardware which is required exists to perform functional performance testing.
 - b. Confirm proper safeties and interlocks are included in design.
 - c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.
 - d. Confirm proper sizing of system control dampers and actuators and damper operation which will result in proper damper positioning.
 - e. Confirm sensors selected are within device ranges.
 - f. Review sequences of operation and obtain clarification from Architect/Engineer.
 - g. Indicate delineation of control between packaged controls and building automation system, listing BAS monitor points and BAS adjustable control points.
 - h. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.
 3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC sections.
 4. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Commissioning Authority and Architect/Engineer.
 5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.
 6. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan and requirements of Section 01 91 00, 23 09 00, and 23 09 23.
 7. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.
 8. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.
 9. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.
 10. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.
- C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:
1. Attend commissioning meetings.
 2. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes. Repeat sample of 20 percent of measurements contained in testing, adjusting, and balancing report as indicated in commissioning plan. Exact locations for the verification testing will be selected by Commissioning Authority.
 3. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.
- 1.8 COMMISSIONING MEETINGS
- A. Section 01 91 00 - Commissioning: Requirements for commissioning meetings.

- B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.9 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements and 01 32 16 - Construction Progress Schedule: Requirements for scheduling.
- B. Contractor to prepare schedule indicating anticipated start dates for the following:
 - 1. Piping system pressure testing.
 - 2. Piping system flushing and cleaning.
 - 3. Ductwork cleaning.
 - 4. Ductwork pressure testing.
 - 5. Equipment and system startups.
 - 6. Automatic temperature control system checkout.
 - 7. Testing, adjusting, and balancing.
 - 8. HVAC system orientation and inspections.
 - 9. Operation and maintenance manual submittals.
 - 10. Training sessions.
- C. Schedule seasonal tests of equipment and systems during peak weather conditions to observe full-load performance.
- D. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy and use.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Notify Commissioning Authority minimum of 3 weeks in advance of the following:
 - 1. Scheduled equipment and system startups.
 - 2. Scheduled automatic temperature control system checkout.
 - 3. Scheduled start of testing, adjusting, and balancing work.
- C. Coordinate programming of automatic temperature control system with construction and commissioning schedules.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

2.1 INSTALLATION

- A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required to provide a complete and balanced system in accordance with the Contract Documents.
- B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.
- C. Install replacement sheaves and belts to obtain system performance, as required to provide a complete and balanced system in accordance with the Contract Documents.
- D. Install test holes in ductwork and plenums as requested by Commissioning Authority for taking air measurements. Refer to Section 23 05 93 and 23 33 00.
- E. Prior to start of functional performance test, install replacement filters in equipment in accordance with Section 23 40 00.

2.2 COMMISSIONING

- A. Seasonal Sensitive Functional Performance Tests:
 - 1. Test heating equipment at winter design temperatures.
 - 2. Test cooling equipment at summer design temperatures with fully occupied building.
 - 3. Participate in testing delayed beyond Final Completion to test performance at peak seasonal conditions.
- B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.

- C. Occupancy Sensitive Functional Performance Tests:
 - 1. Test equipment and systems affected by occupancy variations at minimum and peak loads to observe system performance.
 - 2. Participate in testing delayed beyond Final Completion to test performance with actual occupancy conditions.
- D. Warranty Period Re-Commissioning:
 - 1. Return to site minimum (8) eight months after Substantial Completion and before the expiration of correction / warranty period.
 - a. Review current equipment and system operation and condition of outstanding issues related to original and seasonal commissioning with Owner's personnel.
 - b. Interview Owner's personnel to identify problems or concerns regarding equipment and system operation.
 - c. Make suggestions for improvements and for recording changes in operation and maintenance manuals.
 - d. Identify deficiencies covered by warranty or original construction contract.
 - e. Assist Owner's personnel to develop reports, documents and requests for services to remedy outstanding problems.

* * *

HVAC INSTRUMENTATION & CONTROLS

Section 23 09 00

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Scope of Work Covered by this Section:

1. Furnish a totally native BACnet-based system to integrate proprietary Daikin VRV units via manufacturer provided BACnet protocol converter, exhaust fans, global controller including a Webserver for graphical user interface via world wide web. The global controller, exhaust fan controllers and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135, BACnet.
2. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications.
3. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
4. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
5. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
6. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
7. Provide and install all interconnecting cables between all operator's terminals and peripheral devices supplied under this section.
8. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
9. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.
10. Provide a comprehensive operator and technician training program as described herein.
11. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
12. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.

1.2 RELATED SECTIONS

- A. Section 15050 - Basic Mechanical Materials and Methods: Piping and terminal units requirements.
- B. Section 16050 - Basic Electrical Materials and Methods: Terminal unit rough-in requirements.

1.3 REFERENCE STANDARDS

- A. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
- B. ANSI/ASHRAE Standard 135, BACnet.
- C. Uniform Building Code (UBC), including local amendments.
- D. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
- E. National Electrical Code (NEC).
- F. FCC Part 15, Subpart J, Class A.
- G. EMC Directive 89/336/EEC (European CE Mark).
- H. UL-864 UUKL listing for Smoke Controls for any equipment used in smoke control sequences.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
 - B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - C. Drawings:
 - 1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
 - 2. Drawings shall be submitted in the following standard sizes: 11 x 17 inch (ANSI B).
 - 3. Eight complete sets (copies) of submittal drawings shall be provided.
 - 4. Drawings shall be available on CD-ROM.
 - D. System Documentation: Include the following in submittal package:
 - 1. System configuration diagrams in simplified block format.
 - 2. All input/output object listings and an alarm point summary listing.
 - 3. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
 - 4. Complete bill of materials, valve schedule and damper schedule.
 - 5. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
 - 6. Overall system operation and maintenance instructions-including preventive maintenance and troubleshooting instructions.
 - 7. For all system elements-operator's workstations, building controllers, application controllers, routers, and repeaters-provide BACnet Protocol Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135.
 - 8. Provide complete description and documentation of any proprietary (non-BACnet) services and/or objects used in the system.
 - 9. A list of all functions available and a sample of function block programming that shall be part of delivered system.
 - E. Project Management: The vendor shall provide a detailed project design and installation schedule with time markings and details for hardware items and software development phases.
- 1.5 QUALITY ASSURANCE
- A. The Building Automation System (BAS) system shall be designed, installed, commissioned, and serviced by manufacturer authorized and trained personnel. System provider shall have an in-place support facility within 2 hours response time of the site with technical staff, spare parts inventory, and necessary test and diagnostic equipment.
 - B. The contractor shall provide full-time, on-site, experienced project manager for this work, responsible for direct supervision of the design, installation, start-up and commissioning of the BAS system.
 - C. The Bidder shall be regularly engaged in the design, installation and maintenance of BAS systems and shall have demonstrated technical expertise and experience in the design, installation and maintenance of BAS systems similar in size and complexity to this project. Bidders shall provide a list of at least 10 projects, similar in size and scope to this project completed within the past 3 years.
 - D. Materials and equipment shall be manufacturer's latest standard design that complies with the specification requirements.
 - E. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX.
 - F. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.
 - G. Control system shall be engineered, programmed and supported completely by representative's local office that must be within 100 miles (161 km) of project site.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Store products in manufacturer's unopened, labeled packaging until ready for installation. Store products within the range of manufacturer's absolute limits for environmental

conditions including but not limited to temperature and humidity.

1.7 WARRANTY

- A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system acceptance. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours, Monday through Friday and 48 hours on Saturday and Sunday. Warranty shall apply equally to both hardware and software.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Alerton Inc., Siemens, Automated Logic.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 SYSTEM DESCRIPTION

- A. A distributed logic control system complete with all software and hardware functions shall be provided and installed. System shall be completely based on ANSI/ASHRAE Standard 135-2008, BACnet and achieved listing under the BACnet Testing Laboratories BACnet. Global controller shall integrate Daikin VRV System, exhaust fan controllers and other HVAC system controls to single global controller and web server.

2.3 DDC EQUIPMENT AND SOFTWARE

- A. Workstation: IBM-compatible microcomputer with minimum configuration as follows:
 - 1. Processor: Intel Pentium, 3.2 GHz.
 - 2. Random-Access Memory: 1.0 GB RAM.
 - 3. Hard-Disk Drive: 120 GB.
 - 4. Tape Backup System (120 GB compressed.)
 - 5. CD Rom & CD Burner.

2.4 ELECTRIC THERMOSTATS

- A. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch type, or equivalent solid-state type, with heat anticipator, integral manual on-off-auto selector switch.
 - 1. Equip thermostats, which control electric coiling fans directly, with off position on dial wired to break ungrounded conductors.

2.5 CO SYSTEM SPECIFICATION

- A. The Carbon Monoxide Detecting and Ventilation Fan Control System (CO System) including, wiring and conduit, shall be furnished and installed by AC Energy Systems, Inc., or approved equal, to provide a complete operational system. All conduit, wiring and terminations shall be in accordance with the manufacturer's printed instructions. All wiring to be in conduit. No exposed wiring is allowed. Starters shall be furnished and installed by others.
- B. CO System shall be microprocessor based utilizing MOS (metal oxide semiconductor) solid state remote sensors as manufactured by Quantum Group, Inc.
- C. All periodic calibration and maintenance labor and materials shall be included to cover a period of 12 months from owner's acceptance of the CO System. Quantum CO Control board shall have a 5-year factory equipment warranty. The plug-in CO module shall have a 2.5-year warranty.
- D. Each CO sensor shall be housed in a lockable, painted, 16 gauge steel enclosure. Enclosure shall have colored panel lights that are labeled: "POWER", "FAN", and "ALARM". An 85-dB audible alarm shall be mounted at each sensor location to alarm if alarm limits are exceeded for 15 minutes or if sensor is in fault.
- E. Each CO sensor shall automatically compensate for temperature and humidity over the range of -10 to 125 F and 10-90% relative humidity to stabilize the setpoint and prevent false alarms.
- F. CO System shall turn fan(s) on when CO level exceeds 25 ppm for more than 3 minutes. Fans shall automatically turn off when CO levels drop below 25 ppm. System shall have a "minimum fan run-time" to allow fan motors to cool off.

- G. Unit shall go into high CO alarm if the CO level exceeds 100 ppm for 15 minutes of the concentration over the previous 8 hours exceeds and average of 25 ppm. Alarms at each sensing unit shall automatically reset when CO concentration levels fall below the alarm level.
- H. Sensors shall be factory pre-calibrated and shall be a plug-in module not requiring any soldering, mechanical fastening or wiring. Unit shall provide an audible signal 60 days prior to expiration of sensor module. If the sensor module is not replaced within 60 days, then the unit shall turn fans on and signal a fault condition.
- I. CO System to provide fail-safe (fans running) operation if control wires are broken, sensor fails, or power is lost to the sensing unit.

2.6 WEB INTERFACE

A. General:

- 1. BAS supplier shall provide Web-based access to the system as part of standard installation. User must be able to access all displays of real-time data that are part of the BAS using a standard Web browser. Web browser shall tie into the network through owner-supplied Ethernet network connection. Web page host shall be a separate device that resides on the BAS BACnet network, but is not the BAS server for the control system. BAS server must be a separate computer from the Web page host device to ensure data and system integrity. The Web page software shall not require a per-user licensing fee or annual fees. The Web page host must be able to support on average 50 simultaneous users with the ability to expand the system to accommodate an unlimited number of users. Provide Iport or BCM.WEB as applicable to project size.

B. Browser Technology:

- 1. Browser shall be standard version of Microsoft Internet Explorer v6.0 or later, Firefox v2.0 or later and Safari v2.0 or later (on Mac OS X). PDA browser connection shall be Pocket PC 2003, Windows Mobile 5.0, or Blackberry. No special vendor-supplied software shall be needed on computers running browser. All displays shall be viewable and the Web page host shall directly access real-time data from the BAS BACnet network. Data shall be displayed in real-time and update automatically without user interaction. User shall be able to change data on displays if logged in with the appropriate user name and password.

C. Communications:

- 1. Web page host shall include two Ethernet network connections. One network connection shall be dedicated to BAS BACnet network and shall be used to gather real-time data from all the BACnet devices that form the BAS. This network shall communicate using BACnet, allowing the Web page host to gather data directly from units on the local LAN or from other projects connected over a WAN. This network shall also provide the connection to the BAS server for Web page generation.
- 2. The second Ethernet connection shall provide the physical connection to the Internet or an IP-based WAN. It shall be the port that is used for the browser to receive Web pages and data from the Web page host. The Web page host shall act as a physical barrier between the BAS network and the WAN or Internet connection that allows the browser to receive Web pages and data. The two separate network connections provide for a physical barrier to prevent raw BACnet traffic being exposed on the IP network.
- 3. The Web page host shall provide for complete isolation of the IP and BACnet networks by not routing networking packets between the two networks.
- 4. BAS BACnet Ethernet network shall be provided and installed by the BAS supplier. Owner shall provide and incur any monthly charges of WAN/Internet connection.

D. Display of Data:

- 1. Web page graphics shown on browser shall be replicas of the BAS displays. User shall need no additional training to understand information presented on Web pages when compared to what is shown on BAS displays. Web page displays shall include animation just as BAS displays. Fans shall turn, pilot lights shall blink, coils shall change colors, and so on.

2. Real-time data shall be shown on all browser Web pages. This data must be directly gathered using the BACnet network and automatically updated on browser Web page displays without any user action. Data on the browser shall automatically refresh as changes are detected without re-drawing the complete display.
 3. It shall be possible for user from browser Web page to change data if the user is logged on with the appropriate password. Clicking on a button or typing in a new value shall change digital data. Using pull-down menus or typing in a new value shall change analog data.
 4. Data displays shall be navigated using pushbuttons on the displays that are simply clicked on with the mouse to select a new display. Alternatively, the standard back and forward buttons of the browser can be used for display navigation.
- E. Time Schedule Adjustment:
1. Web access shall allow user to view and edit all schedules in the system. This includes standard, holiday and event schedules as described in BAS specification. Display of schedules shall show interaction of all schedules on a single display so user sees an overview of how all work together. User shall be able to edit schedules from this display.
 2. Display of all three schedules must show all ON times for standard, holiday and event schedules in different colors on a given day. In addition, OFF times for each must also be shown in additional colors. User shall be able to select from standard calendar what days are to be scheduled and same display shall show all points and zones affected. User shall be able to set time for one day and select all days of the week that shall be affected as a recurrence of that same schedule for that given day.
 3. Schedule list shall show all schedules currently defined. This list shall include all standard, holiday and event schedules. In addition, user shall be able to select a list that shows all scheduled points and zones.
- F. Logging of Information:
1. User shall use standard browser technology to view all trendlogs in system. User shall be able to view logged data in tabular form or graphical format. User shall be able to adjust time interval of logged data viewed and shall be able to adjust Y axis of data viewed in graphical format. User shall also be able to download data through the Web interface to local computer. Data shall be in CSV format.
- G. Alarm Handling:
1. Web interface shall display alarms as they occur. User shall be able to acknowledge alarms using browser technology. In addition, user shall be able to view history of alarm occurrence over a user-selected time frame. In addition, those alarms may be filtered for viewing per user-selected options. A single selection shall display all alarms that have not been acknowledged.
- H. Web Page Generation:
1. Web pages shall be automatically generated from the BAS displays that reside on the BAS server. User shall access Web page host through the network and shall initiate a Web page generation utility that automatically takes the BAS displays and turns them into Web pages. The Web pages generated are automatically installed on the Web page host for access using any computer's standard browser. Any system that requires use of an HTML editor for generation of Web pages shall not be considered.
- I. Password Security and Activity Log:
1. Access through Web browser shall utilize the same hierarchical security scheme as BAS system. User shall be asked to log on once the browser makes connection to Web page host. Once the user logs in, any and all changes that are made shall be tracked by the BAS system. The user shall be able to change only those items he or she has authority to change. A user activity report shall show any and all activity of the users who have logged in to the system, regardless of whether those changes were made using a browser or through the BAS workstation.
- J. BACnet Communication:
1. Web server shall directly communicate to all devices on the BAS network using

BACnet protocol. No intermediate devices shall be necessary for BACnet communication.

2.7 BUILDING GLOBAL CONTROLLER

A. General Requirements:

1. BACnet Conformance:
 - a. Building Controller shall be approved by the BTL as meeting the BACnet Building Controller requirements.
 - b. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
2. Building controller shall be of modular construction such that various modules may be selected to fit the specific requirements of a given project. At a minimum, modules shall consist of a power supply module, a BACnet Ethernet-MS/TP (master slave token passing) module, a BACnet MS/TP-only module, and a modem module for telephone communication. Those projects that require special interfaces may use Modbus modules as needed. However, all Ethernet communications and all controllers-including central plant controllers, advanced application controllers and unitary controllers-supplied by BAS manufacturer shall utilize the BACnet protocol standard.
3. Modules shall be selected to fit the particular project application. Up to seven modules shall be powered by a single power supply module. All modules shall be panel-mounted on DIN rail for ease of addition and shall be interconnected using a simple plug-in cable. A module in the middle shall be replaceable without removing any other modules.
4. All modules shall be capable of providing global control strategies for the system based on information from any objects in the system, regardless if the object is directly monitored by the building controller module or by another controller. The software program implementing these strategies shall be completely flexible and user-definable. All software tools necessary for programming shall be provided as part of project software. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site, using a WAN or downloaded through remote communications are not acceptable. Changing global strategies using firmware changes is also unacceptable.
5. Programming shall be object-oriented using control function blocks, and support DDC functions, 1000 Analog Values and 1000 Binary Values. All flowcharts shall be generated and automatically downloaded to controller. Programming tool shall be supplied and be resident on workstation. The same tool shall be used for all controllers.
6. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed using the operator's workstation or field computer.
7. Controller shall have sufficient memory to ensure high performance and data reliability. Battery shall provide power for orderly shutdown of controller and storage of data in nonvolatile flash memory. Battery backup shall maintain real-time clock functions for a minimum of 20 days.
8. Global control algorithms and automated control functions shall execute using 32-bit processor.

B. Schedules:

1. Each building controller module shall support a minimum of 80 BACnet Schedule Objects and 80 BACnet Calendar Objects.
2. Building controller modules shall provide normal seven-day scheduling, holiday scheduling and event scheduling.

3. Logging Capabilities
 - a. Each building controller shall log as minimum 320 values. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
 - b. Logs may be viewed both on-site or off-site using WAN or remote communication.
 - c. Building controller shall periodically upload trended data to networked operator's workstation for long-term archiving if desired.
 - d. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
- C. Alarm Generation:
 1. Alarms may be generated within the system for any object change of value or state (either real or calculated). This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
 2. Each alarm may be dialed out as noted elsewhere.
 3. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.
 4. Controller must be able to handle up to 320 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.
- D. Demand Limiting:
 1. Demand limiting of energy shall be a built-in, user-configurable function. Each controller module shall support shedding of up to 200 loads using a minimum of two types of shed programs.
 2. Load shedding programs in building controller modules shall operate as defined in section 2.3.J of this specification.
- E. Tenant Activity Logging:
 1. Tenant Activity logging shall be supported by building controller module. Each independent module shall support a minimum of 80 zones.
 2. Tenant Activity logging shall function as defined in this specification.
- F. Ethernet - MS/TP Module:
 1. Ethernet - MS/TP Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
 2. All communication with operator's workstation and all application controllers shall be through BACnet. Building controller Ethernet - MS/TP module shall incorporate as a minimum, the functions of a 2-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz) and MS/TP LAN. Ethernet - MS/TP module shall also route messages from all other building controller modules onto the BACnet Ethernet network.
 - a. MS/TP LAN must be software-configurable from 9.6 to 76.8Kbps.
 - b. The RJ-45 Ethernet connection must accept either 10Base-T or 100Base-TX BACnet over twisted pair cable (UTP).
 3. BACnet Conformance:
 - a. Ethernet - MS/TP module shall, as a minimum, support MS/TP and Ethernet BACnet LAN types. It shall communicate directly using these BACnet LANs as a native BACnet device and shall support simultaneous routing functions between all supported LAN types. Global controller shall be approved by the BACnet Testing Laboratory (BTL) as meeting the BACnet Building Controller requirements.
 - b. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
 - c. The building controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on WANs and

CANs and function as a BACnet Broadcast Management Device (BBMD).

- G. MS/TP Module:
 - 1. MS/TP Module shall support every function as listed under paragraph A, General Requirements, of this section and the following.
 - 2. Building controller MS/TP module communications shall be through BACnet MS/TP LAN to all advanced application and application-specific controllers. MS/TP module shall also route messages to Ethernet - MS/TP module for communication over WAN.
 - a. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps
 - b. Configuration shall be through RS-232 connection.
 - 3. BACnet Conformance:
 - a. MS/TP module shall be approved by the BTL (BACnet Testing Laboratory) as meeting the BACnet Building Controller requirements. MS/TP module shall as a minimum support MS/TP BACnet LAN type. It shall communicate directly using this BACnet LAN as a native BACnet device and shall support simultaneous routing functions between all supported LAN types.
 - b. Standard BACnet object types supported shall include, as a minimum, Analog Value, Binary Value, Calendar, Device, File, Group, Notification Class, Program, and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
 - H. Power Supply Module:
 - 1. Power supply module shall power up to seven building controller modules. Input for power shall accept between 17-30VAC, 47-65Hz.
 - 2. Power supply module shall include rechargeable battery for orderly shutdown of controller modules including storage of all data in flash memory and for continuous operation of real-time clocks for minimum of 20 days.
- 2.8 DAIKIN VRV SYSTEM
- A. Integrate via BACnet over IP to variable refrigerant volume fan coils and condensing units via manufacturer provide BACnet protocol converter.
- 2.9 ENCLOSURES
- A. All controllers, power supplies and relays shall be mounted in enclosures.
 - B. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean environment.
 - C. Enclosures shall have hinged, locking doors.
 - D. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall be 0.125 inches (3 mm) thick and appropriately sized to make label easy to read.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.
- B. Notify the owner's representative in writing of conditions detrimental to the proper and timely completion of the work.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. Commencement of installation is considered acceptance of substrate conditions.

3.3 INSTALLATION (GENERAL)

- A. Install in accordance with manufacturer's instructions.

- B. Provide all miscellaneous devices, hardware, software, interconnections, installation, and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.
- 3.4 LOCATION AND INSTALLATION OF COMPONENTS
- A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3 feet (1 m) of clear access space in front of units. Obtain approval on locations from owner's representative prior to installation.
 - B. All instruments, including but not limited to switches and transmitters, shall be suitably wired and mounted to protect them from vibration, moisture, and high or low temperatures.
 - C. Identify all equipment and panels. Provide permanently mounted tags for all panels.
 - D. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections, and sized to suit pipe diameter without restricting flow.
- 3.5 INTERLOCKING AND CONTROL WIRING
- A. Provide all interlock and control wiring. All wiring shall be installed neatly and professionally, in accordance with Specification Division 16 and all national, state and local electrical codes.
 - B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.
 - C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner's representative prior to rough-in.
 - D. Provide auxiliary pilot duty relays on motor starters as required for control function.
 - E. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings; coordinate with electrical contractor.
 - F. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. All other wiring to be installed neatly and inconspicuously per local code requirements. If local code allows, control wiring above accessible ceiling spaces may be run with plenum-rated cable (without conduit).
- 3.6 DDC OBJECT TYPE SUMMARY
- A. Provide all database generation.
 - B. Displays
 - 1. System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the owner. Provide outside air temperature indication on all system displays associated with economizer cycles.
 - C. Run Time Totalization
 - 1. At a minimum, run time totalization shall be incorporated for each monitored supply fan, return fan, exhaust fan, hot water and chilled water pumps. Warning limits for each point shall be entered for alarm and or maintenance purposes.
 - D. Trendlog
 - 1. All binary and analog object types (including zones) shall have the capability to be automatically trended.
 - E. Alarm
 - 1. All analog inputs (High/Low Limits) and selected binary input alarm points shall be prioritized and routed (locally or remotely) with alarm message per owner's requirements.
 - F. Database Save
 - 1. Provide backup database for all standalone application controllers on disk.
- 3.7 FIELD SERVICES
- A. Prepare and start logic control system under provisions of this section.
 - B. Start up and commission systems. Allow sufficient time for startup and commissioning prior to placing control systems in permanent operation.
 - C. Provide the capability for off-site monitoring at control contractor's local or main office. At a minimum, off-site facility shall be capable of system diagnostics and software download. Owner shall provide phone line for this service for one year or as specified.

- D. Provide owner's representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.8 TRAINING

- A. Provide application engineer to instruct owner in operation of systems and equipment.
- B. Provide system operator's training to include (but not be limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of three persons.
- C. Provide on-site training above as required, up to 16 hours as part of this contract.
- D. Provide tuition for at least one individual to attend for a one-week factory training class. If applicable, costs for travel, lodging and meals will be the responsibility of the owner.

3.9 DEMONSTRATION

- A. Demonstrate complete operating system to owner's representative.
- B. Provide certificate stating that control system has been tested and adjusted for proper operation.
- C. Provide a complete and operational temperature control and building automation system based on the following points and sequence of operation. The system shall be complete as to sequences and standard control practices. The determined point list is the minimum amount of points that are to be provided. If additional points are required to meet the sequence of operation, they will be provided.
- D. BACnet Object List:
 - 1. The following points as defined for each piece of equipment are designated as follows:
 - a. Binary Out (BO): Defined as any two-state output (start/stop) (enable/disable), or other.
 - b. Binary In (BI): Defined as any two-state input (alarm, status), or other.
 - c. Analog In (AI): Defined as any variable input (temperature) (position), or other.
 - d. Analog Out (AO): Defined as any electrical variable output. 0-20mA, 4-20mA and 0-10VDC are the only acceptable analog outputs. The driver for analog outputs must come from both hardware and software resident in the controllers. Transducers will not be acceptable under any circumstance.
 - e. Analog Value (AV): Hardware points, software points, graphed as standard with manufacturer.
 - 1) Hardware Points: AI, AO, BI, BO.
 - 2) Software Points: AV, BV, Sched, Trend, Alarm.
 - 3) Show on graphic.

3.10 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

* * *

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

Section 23 09 93

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section for LEED Requirements.
 - 2. Division 01 Section 01 91 00 "General Commissioning Requirements."
 - 3. Division 23 Section 23 08 00 "Commissioning of HVAC Systems."
 - 4. Division 23 Section "Instrumentation and Control for HVAC" for control equipment and devices and submittal requirements.

1.3 SUBMITTALS

- A. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- B. Submit detailed sequence of operation for each piece of equipment with the control drawings.

1.4 DEFINITIONS

- A. DDC: Direct-digital controls.

1.5 EXHAUST FAN CONTROL

- A. Provide DDC status and alarm for each exhaust fan. Inter lock exhaust fan EF-1 with supply fan SF-1 via DDC output. Control EF-1 on/off with carbon monoxide (CO) sensors located in the garage (manually set VFD for constant speed operation). Switch EF-2 with 0 to 2 hour timer wall switch (manually set VFD for constant speed operation). Switch EF-3 with thermostat. Switch EF-4 and 5 with 0 to 2 hour timer wall switch. EF-6 shall run continuously (shut off EF-6 via DDC output). Switch EF-7 with Bathroom #317 light switch.

1.6 SUPPLY FAN CONTROL

- A. Provide DDC status and alarm for each supply fan. Inter lock supply fan SF-1 with exhaust fan EF-1 via DDC output as noted above. Inter lock SF-2 with FC-4A and 4B via DDC output (either FC running energizes SF-2). Inter lock SF-3 with FC-5, 6 and 7 via DDC output (any FC running energizes SF-3). Inter lock SF-4 with FC-8, 9 and 10 via DDC output (any FC running energizes SF-4). Inter lock SF-5 with FC-12A and 12B via DDC output (any FC running energizes SF-5). Inter lock SF-6 with FC-11A and FC-13 through 26 via DDC output (any FC running energizes SF-6).

1.7 POWERED FILTRATION CONTROL

- A. Provide DDC status and alarm for each powered filtration fan. Control each PF-1 on/off via a central TCMM timer control system panel with a carbon monoxide (CO) sensor located in each apparatus bay.

1.8 SPLIT SYSTEM VARIABLE REFRIGERANT FLOW (VRF) HEAT RECOVERY UNIT

- A. Provide control using electric actuation with a programmable thermostat or control panel. Provide DDC alarm input for each unit. Each VRF FC unit programmable thermostat controller shall energize the associated VRF condensing unit to provide heating or cooling via the VRF control system.
- B. Each VRF system shall operate continuously.
- C. Each VRF system shall operate as follows:
 - 1. The fan starts or continues to run and the unit is controlled as follows:
 - a. Cooling: Upon a call for cooling, the cooling mode is enabled to satisfy space-cooling load. When the space-cooling load is satisfied, the cooling mode is disabled.
 - b. Heating – upon a call for heating, the heating mode is enabled to satisfy space – heating load. When the space-heating load is satisfied, the heating mode is disabled.

- D. Operator Station Display: Indicate the following on operator workstation display terminal (minimum requirements):
 - 1. System graphic(s) with alarm(s).
- 1.9 SPLIT SYSTEM HEAT PUMP UNIT
- A. Provide control using electric actuation with a programmable thermostat or control panel. Provide DDC alarm input for each unit.
 - B. Each HP unit shall operate continuously.
 - C. Each HP unit shall operate as follows:
 - 1. The fan starts or continues to run and the unit is controlled as follows:
 - a. Cooling: Upon a call for cooling, the cooling mode is enabled to satisfy space-cooling load. When the space-cooling load is satisfied, the cooling mode is disabled.
 - b. Heating – upon a call for heating, the heating mode is enabled to satisfy space – heating load. When the space-heating load is satisfied, the heating mode is disabled.
 - D. Operator Station Display: Indicate the following on operator workstation display terminal (minimum requirements):
 - 1. System graphic(s) with alarm(s).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

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FACILITY FUEL-OIL PIPING

Section 23 11 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes diesel-fuel-oil distribution systems and the following:
 1. Pipes, tubes, and fittings.
 2. Piping and tubing joining materials.
 3. Piping specialties.
 4. Valves.
 5. Horizontal, steel, fuel-oil ASTs.
 6. Insulated, steel, fuel-oil ASTs.
 7. Concrete-vaulted, steel, fuel-oil ASTs.
 8. Fuel-oil AST accessories.
 9. Fuel-oil UST accessories.
 10. Fuel-oil storage tank piping specialties.
 11. Fuel maintenance system.
 12. Liquid-level gage system.
 13. Leak-detection and monitoring system.
 14. Concrete bases.

1.3 DEFINITIONS

- A. AST: Aboveground storage tank.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- D. FPM: Vinylidene fluoride-hexafluoropropylene copolymer rubber.
- E. FRP: Glass-fiber-reinforced plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Maximum Operating-Pressure Ratings: 3-psig (21-kPa) fuel-oil supply pressure at oil-fired appliances.
- B. Delegated Design: Design restraint and anchors for fuel-oil piping, ASTs, and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Seismic Performance: Factory-installed support attachments for AST shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles. Also include, where applicable, rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 1. Piping specialties.
 2. Valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.
 3. Each type and size of fuel-oil storage tank. Indicate dimensions, weights, loads, components, and location and size of each field connection.
 4. Fuel-oil storage tank accessories.
 5. Fuel-oil storage tank piping specialties.

6. Fuel-oil storage tank pumps.
 7. Fuel maintenance system.
 8. Liquid-level gage system.
 9. Leak-detection and monitoring system.
- B. Shop Drawings: For facility fuel-oil piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
1. Shop Drawing Scale: 1/4 inch per foot (1:50).
 2. For fuel-oil storage tanks and pumps, include details of supports and anchors.
- C. Delegated-Design Submittal: For fuel-oil piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of anchors and seismic restraints.
 2. Design Calculations: Calculate requirements for selecting seismic restraints.
 3. Detail fabrication and assembly of pipe anchors, hangers, supports for multiple pipes, and attachments of the same to building structure.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Coordination Drawings: Plans and details, drawn to scale, on which fuel-oil piping is shown and coordinated with other installations, using input from installers of the items involved.
- B. Site Survey: Plans, drawn to scale, on which fuel-oil piping and tanks are shown and coordinated with other services and utilities.
- C. Qualification Data: For qualified professional engineer.
- D. Seismic Qualification Certificates: For ASTs, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Brazing certificates.
- F. Welding certificates.
- G. Field quality-control reports.
- H. Warranty: Sample of special warranty.
- 1.7 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For fuel-oil equipment and accessories to include in emergency, operation, and maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.
- F. Comply with requirements of the EPA and of state and local authorities having jurisdiction. Include recording of fuel-oil storage tanks and monitoring of tanks and piping.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Lift and support fuel-oil storage tanks only at designated lifting or supporting points, as shown on Shop Drawings. Do not move or lift tanks unless empty.

- B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
 - C. Store pipes and tubes with protective PE coating to avoid damaging the coating and to protect from direct sunlight.
 - D. Store PE pipes and valves protected from direct sunlight.
- 1.10 COORDINATION
- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- 1.11 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-oil storage tanks and flexible, double-containment piping and related equipment that fail in materials or workmanship within specified warranty period.
 - 1. Storage Tanks:
 - a. Failures include, but are not limited to, the following when used for storage of fuel oil at temperatures not exceeding 150 deg F (66 deg C):
 - 1) Structural failures including cracking, breakup, and collapse.
 - 2) Corrosion failure including external and internal corrosion of steel tanks.
 - b. Warranty Period: 30 years from date of Substantial Completion.
 - 2. Flexible, Double-Containment Piping and Related Equipment:
 - a. Failures due to defective materials or workmanship for materials installed together, including piping, dispenser sumps, entry boots, and sump mounting adapters.
 - b. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. See Part 3 piping schedule articles for where pipes, tubes, fittings, and joining materials are applied in various services.
- B. Rigid, Double-Containment Piping: Comply with UL 971.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ameron International; Fiberglass Pipe Group.
 - b. Conley Corporation.
 - c. Perma-Pipe, Inc.
 - d. Smith Fibercast.
 - 2. RTRP: ASTM D 2996 or ASTM D 2997 carrier and containment piping and mechanical couplings to seal carrier and containment piping or individually bonded joints.
 - a. Minimum Operating-Pressure Rating for RTRP NPS 2 and NPS 3 (DN 50 and DN 80): 150 psig (1035 kPa).
 - b. Minimum Operating-Pressure Rating for RTRP NPS 4 and NPS 6 (DN 100 and DN 150): 125 psig (860 kPa). Compliance with UL 971 is not required for NPS 6 (DN 150) and larger piping.
 - c. Fittings: RTRF complying with ASTM D 2996 or ASTM D 2997, and made by RTRP manufacturer; watertight sump entry boots, termination, or other end fittings.
 - 3. Include design and fabrication of double-containment pipe and fitting assemblies with provision for field installation of cable leak-detection system in annular space between carrier and containment piping.

2.2 PIPING SPECIALTIES

- A. Flexible Connectors: Comply with UL 567.
 - 1. Metallic Connectors:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Flexicraft Industries.
 - 2) Metraflex Company (The).
 - 3) Or approved equal.

- b. Listed and labeled for aboveground and underground applications by an NRTL acceptable to authorities having jurisdiction.
 - c. Stainless-steel bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
 - d. Minimum Operating Pressure: 150 psig (1035 kPa).
 - e. End Connections: Socket, flanged, or threaded end to match connected piping.
 - f. Maximum Length: 30 inches (762 mm.)
 - g. Swivel end, 50-psig (345-kPa) maximum operating pressure.
 - h. Factory-furnished anode.
- B. Y-Pattern Strainers:
- 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - 2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
 - 3. Strainer Screen: 80-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig (860 kPa).
- C. Basket Strainers:
- 1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
 - 2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
 - 3. Strainer Screen: 80-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig (860 kPa).
- D. T-Pattern Strainers:
- 1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
 - 2. End Connections: Grooved ends.
 - 3. Strainer Screen: 80-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
 - 4. CWP Rating: 750 psig (5170 kPa).
- E. Manual Air Vents:
- 1. Body: Bronze.
 - 2. Internal Parts: Nonferrous.
 - 3. Operator: Screwdriver or thumbscrew.
 - 4. Inlet Connection: NPS 1/2 (DN 15).
 - 5. Discharge Connection: NPS 1/8 (DN 6).
 - 6. CWP Rating: 150 psig (1035 kPa).
 - 7. Maximum Operating Temperature: 225 deg F (107 deg C).
- 2.3 JOINING MATERIALS
- A. Joint Compound and Tape: Suitable for fuel oil.
 - B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 - C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.
 - D. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- 2.4 MANUAL FUEL-OIL SHUTOFF VALVES
- A. See valve schedule in Part 3 for where each valve type is applied in various services.
 - B. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller for Liquid Service: Comply with UL 842.
 - 1. CWP Rating: 125 psig (860 kPa).
 - 2. Threaded Ends: Comply with ASME B1.20.1.
 - 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 - 4. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.

5. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- C. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with UL 842.
 1. CWP Rating: 125 psig (860 kPa).
 2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
 3. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
 4. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- 2.5 SPECIALTY VALVES
 - A. Pressure Relief Valves: Comply with UL 842.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anderson Greenwood; Division of Tyco Flow Control.
 - b. Fulflo Specialties, Inc.
 - c. Webster Fuel Pumps & Valves; a division of Capital City Tool, Inc.
 2. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 3. Body: Brass, bronze, or cast steel.
 4. Springs: Stainless steel, interchangeable.
 5. Seat and Seal: Nitrile rubber.
 6. Orifice: Stainless steel, interchangeable.
 7. Factory-Applied Finish: Baked enamel.
 8. Maximum Inlet Pressure: 150 psig (1035 kPa).
 9. Relief Pressure Setting: 60 psig (414 kPa).
 - B. Oil Safety Valves: Comply with UL 842.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anderson Greenwood; Division of Tyco Flow Control.
 - b. Suntec Industries Incorporated.
 - c. Webster Fuel Pumps & Valves; a division of Capital City Tool, Inc.
 2. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 3. Body: Brass, bronze, or cast steel.
 4. Springs: Stainless steel.
 5. Seat and Diaphragm: Nitrile rubber.
 6. Orifice: Stainless steel, interchangeable.
 7. Factory-Applied Finish: Baked enamel.
 8. Manual override port.
 9. Maximum Inlet Pressure: 60 psig (414 kPa).
 10. Maximum Outlet Pressure: 3 psig (21 kPa).
 - C. Emergency Shutoff Valves: Comply with UL 842.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ameron International; Fiberglass Pipe Group.
 - b. Conley Corporation.
 - c. EMCO Wheaton; a Gardner Denver Company.
 - d. Environ Products, Inc.
 - e. OPW.
 2. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 3. Double poppet valve.
 4. Body: ASTM A 126, cast iron.
 5. Disk: FPM.
 6. Poppet Spring: Stainless steel.
 7. Stem: Plated brass.
 8. O-Ring: FPM.

9. Packing Nut: PTFE-coated brass.
 10. Fusible link to close valve at 165 deg F (74 deg C).
 11. Thermal relief to vent line pressure buildup due to fire.
 12. Air test port.
 13. Maximum Operating Pressure: 0.5 psig (3.45 kPa).
- D. Mechanical Leak Detector: Comply with UL 842.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. FE Petro, Inc.
 - b. Red Jacket Pumps; a division of Veeder-Root.
 - c. Or approved equal.
 2. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 3. Body: ASTM A 126, cast iron.
 4. O-Rings: Elastomeric compatible with fuel oil.
 5. Piston and Stem Seals: PTFE.
 6. Stem and Spring: Stainless steel.
 7. Piston Cylinder: Burnished brass.
 8. Indicated Leak Rate: Maximum 3 gph (3 mL/s) at 10 psig (69 kPa).
 9. Leak Indication: Reduced flow.
- 2.6 CONCRETE-VAULTED, STEEL, FUEL-OIL AST
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Industrial Fabricators, Inc. Supervault MH Model MH-D1-250.
 2. Or approved equal.
 - B. Description: UL 142 and UL 2085; thermally insulated, fire-resistant and protected, double-wall, horizontal, steel tank; with primary- and secondary-containment walls and insulation and with interstitial space.
 - C. Construction: Fabricated with welded, carbon steel and insulation and encased in concrete that will protect from bullets; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with test temperature according to UL 2085.
 - D. Capacities and Characteristics:
 1. Capacity: 250 gal.
 2. Diameter: 37.25 inches.
 3. Length: 60 inches.
 4. Connection Sizes:
 - a. Fill Line: 4 NPS.
 - b. Vent Line: 2 NPS.
 - c. Outlet: 2 NPS.
 - d. Return: 2 NPS.
 - e. Gage: 2 NPS.
 5. Fuel-Oil Grade Number: 2
- 2.7 FUEL-OIL AST ACCESSORIES
- A. Threaded pipe connection fittings on top of tank, for fill, supply, return, vent, sounding, and gaging. Include cast-iron plugs for shipping.
 - B. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.
 - C. Lifting Lugs: For handling and installation.
 - D. Supply Tube: Extension of supply piping fitting into tank, terminating 6 inches (150 mm) above tank bottom and cut at a 45-degree angle (1:1 slope).
 - E. Sounding and Gage Tubes: Extension of fitting into tank, terminating 6 inches (150 mm) above tank bottom and cut at a 45-degree angle (1:1 slope).
- 2.8 FUEL-OIL STORAGE TANK PIPING SPECIALTIES
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Industrial Metal Fabricators

2. Or approved equal.
 - B. Fitting Materials: Cast iron, malleable iron, brass, or corrosion-resistant metal; suitable for fuel-oil service.
 1. Surface, Flush-Mounted Fittings: Waterproof and suitable for truck traffic.
 2. Aboveground-Mounted Fittings: Weatherproof.
 - C. Spill-Containment Fill Boxes: Flush mounting, with drainage feature to drain oil into tank, threaded fill-pipe connection, and wrench operation.
 - D. Fill Boxes: Flush mounting, with threaded fill-pipe connection and wrench operation.
 - E. Locking Fill Boxes: Flush mounting, with locking-type inner fill cap for standard padlock and threaded fill-pipe connection.
 - F. Supply and Sounding Drop Tubes: Fuel-oil supply piping or fitting, inside tank, terminating 6 inches (150 mm) above bottom of tank, and with end cut at a 45-degree angle (1:1 slope).
 - G. Pipe Adapters and Extensions: Compatible with piping and fittings.
 - H. Suction Strainers and Check Valves: Bronze or corrosion-resistant metal components.
 - I. Foot Valves and Antisiphon Valves: Poppet-type, bronze or corrosion-resistant metal components.
 - J. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.
 - K. Monitoring Well Caps: Locking pipe plug and manhole.
- 2.9 LIQUID-LEVEL GAGE SYSTEM
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Industrial Metal Fabrications, Inc.
 2. Or approved equal.
 - B. Description: Calibrated, liquid-level gage system complying with UL 180 with floats or other sensors and remote annunciator panel.
 - C. Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.
 - D. Controls: Electrical, operating on 120-V ac.
- 2.10 FUEL OIL
- A. Fuel Oil: ASTM D 396, Grade No. 2.
 - B. Diesel Fuel Oil: ASTM D 975, Grade No. 2-D, general-purpose, high volatility.
- 2.11 LABELING AND IDENTIFYING
- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (152 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (762 mm) deep; colored yellow.
- 2.12 SOURCE QUALITY CONTROL
- A. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:
 1. Horizontal, Double-Wall Steel ASTs: UL 142, STI F921, and STI R931.
 2. Horizontal, Containment-Dike, Steel ASTs: UL 142 and STI F911.
 3. Horizontal, Concrete-Vaulted and Insulated, Steel ASTs: UL 142 and UL 2085.
 - B. Affix standards organization's code stamp.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for fuel-oil piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

- 3.2 EARTHWORK
 - A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.
- 3.3 PREPARATION
 - A. Close equipment shutoff valves before turning off fuel oil to premises or piping section.
 - B. Comply with NFPA 30 and NFPA 31 requirements for prevention of accidental ignition.
- 3.4 INDOOR PIPING INSTALLATION
 - A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
 - B. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
 - C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
 - D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - F. Install piping free of sags and bends.
 - G. Install fittings for changes in direction and branch connections.
 - H. Verify final equipment locations for roughing-in.
 - I. Comply with requirements for equipment specifications in plumbing and HVAC Sections for roughing-in requirements.
 - J. Conceal pipe installations in walls, pipe spaces, or utility spaces; above ceilings; below grade or floors; and in floor channels unless indicated to be exposed to view.
 - K. Prohibited Locations:
 - 1. Do not install fuel-oil piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - 2. Do not install fuel-oil piping in solid walls or partitions.
 - L. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
 - M. Connect branch piping from top or side of horizontal piping.
 - N. Install unions in pipes NPS 2 (DN 50) and smaller at final connection to each piece of equipment and elsewhere as indicated. Unions are not required on flanged devices.
 - O. Do not use fuel-oil piping as grounding electrode.
 - P. Install Y-pattern strainer on inlet side of fuel-oil pump.
 - Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
 - R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
 - S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."
- 3.5 VALVE INSTALLATION
 - A. Install manual fuel-oil shutoff valves on branch connections to fuel-oil appliance.
 - B. Install valves in accessible locations.
 - C. Protect valves from physical damage.
 - D. Install metal tag attached with metal chain indicating fuel-oil piping systems.
 - E. Identify valves as specified in Section 230553 "Identification for HVAC Piping and Equipment."
 - F. Install oil safety valves at inlet of each oil-fired appliance.
 - G. Install pressure relief valves in distribution piping between the supply and return lines.
 - H. Install one-piece, bronze ball valve with hose end connection at low points in fuel-oil piping.
 - I. Install manual air vents at high points in fuel-oil piping.
 - J. Install emergency shutoff valves at dispensers.

3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Bevel plain ends of steel pipe.
 - 2. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
- F. Flanged Joints: Install gasket material, size, type, and thickness for service application. Install gasket concentrically positioned.
- G. Flared Joints: Comply with SAE J513. Tighten finger tight, then use wrench according to fitting manufacturer's written recommendations. Do not overtighten.

3.7 FUEL-OIL AST INSTALLATION

- A. Install tank bases and supports.
- B. Connect piping and vent fittings.
- C. Install ground connections.
- D. Install tank leak-detection and monitoring devices.
- E. Install steel ASTs according to STI R912.
- F. Install insulated and concrete-vaulted, steel ASTs according to STI R942.
- G. Fill storage tanks with fuel oil.

3.8 HANGER AND SUPPORT INSTALLATION

- A. Pipe hanger and support and equipment support materials and installation requirements are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1-1/4 (DN 32) and Smaller: Maximum span, 84 inches (2130 mm); minimum rod size, 3/8 inch (10 mm).
 - 2. NPS 1-1/2 (DN 40): Maximum span, 108 inches (2740 mm); minimum rod size, 3/8 inch (10 mm).
 - 3. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (10 mm).
 - 4. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 1/2 inch (13 mm).
 - 5. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).
 - 6. NPS 4 (DN 100): Maximum span, 13 feet (4 m); minimum rod size, 5/8 inch (16 mm).
- C. Support vertical steel pipe at each floor and at spacing not greater than 15 feet (4.5 m).

3.9 FUEL MAINTENANCE SYSTEM INSTALLATION

- A. Install suction line, with foot valve, at one end of storage tank, 1 inch (25 mm) from the bottom of tank.
- B. Install return line at the opposite end of storage tank from suction line.

3.10 LIQUID-LEVEL GAGE SYSTEM INSTALLATION

- A. Install liquid-level gage system. Locate panel inside building where indicated.

3.11 LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION

- A. Install leak-detection and monitoring system. Install alarm panel inside building where indicated.

1. Double-Wall, Fuel-Oil Storage Tanks: Install probes or use factory-installed integral probes in interstitial space.
 2. Single-Wall, Fuel-Oil Storage Tanks: Install probes as indicated.
 3. Double-Containment, Fuel-Oil Piping: Install leak-detection sensor probes in fuel-oil storage tank containment sumps and at low points in piping cable probes in interstitial space of double-containment piping.
 4. Install liquid-level gage.
- 3.12 CONNECTIONS
- A. Install piping adjacent to equipment to allow service and maintenance.
 - B. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.
 - C. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
 - D. Connect piping to equipment with ball valve and union. Install union between valve and equipment.
 - E. Install flexible piping connectors at final connection to burners or oil-fired appliances that must be moved for maintenance access.
- 3.13 LABELING AND IDENTIFYING
- A. Nameplates, pipe identification, and signs are specified in Section 230553 "Identification for HVAC Piping and Equipment."
 - B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on or near each service regulator, service meter, and earthquake valve.
 1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- 3.14 CONCRETE BASES
- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (457-mm) centers around the full perimeter of the base.
 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 6. Use 3000-psig (20.7-MPa), 28-day, compressive-strength concrete and reinforcement as specified in Section 033000 "Cast-in-Place Concrete."
- 3.15 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 - B. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - C. Tests and Inspections:
 1. Tanks: Minimum hydrostatic or compressed-air test pressures for fuel-oil storage tanks that have not been factory tested and do not bear the ASME code stamp or a listing mark acceptable to authorities having jurisdiction:
 - a. Double-Wall Tanks:
 - 1) Inner Tanks: Minimum 3 psig (20.7 kPa) and maximum 5 psig (34.5 kPa).

- 2) Interstitial Space: Minimum 3 psig (20.7 kPa) and maximum 5 psig (34.5 kPa), or 5.3-in. Hg (18-kPa) vacuum.
- b. Where vertical height of fill and vent pipes is such that the static head imposed on the bottom of the tank is greater than 10 psig (69 kPa), hydrostatically test the tank and fill and vent pipes to a pressure equal to the static head thus imposed.
- c. Maintain the test pressure for one hour.
2. Piping: Minimum hydrostatic or pneumatic test-pressures measured at highest point in system:
 - a. Fuel-Oil, Double-Containment Piping:
 - 1) Carrier Pipe: Minimum 5 psig (34.5 kPa) for minimum 30 minutes.
 - 2) Containment Conduit: Minimum 5 psig (34.5 kPa) for minimum 60 minutes.
 - b. Suction Piping: Minimum 20-in. Hg (68 kPa) for minimum 30 minutes.
 - c. Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed 10 psig (69 kPa).
3. Inspect and test fuel-oil piping according to NFPA 31, "Tests of Piping" Paragraph; and according to requirements of authorities having jurisdiction.
4. Test liquid-level gage for accuracy by manually measuring fuel-oil levels at not less than three different depths while filling tank and checking against gage indication.
5. Test leak-detection and monitoring system for accuracy by manually operating sensors and checking against alarm panel indication.
6. Start fuel-oil transfer pumps to verify for proper operation of pump and check for leaks.
7. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
8. Bleed air from fuel-oil piping using manual air vents.
- D. Fuel-oil piping and equipment will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- 3.16 DEMONSTRATION
 - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain liquid-level gage systems, leak-detection and monitoring systems fuel-oil pumps.
- 3.17 INDOOR PIPING SCHEDULE
 - A. Aboveground fuel-oil piping shall be one of the following:
 1. NPS 1/2 (DN 15) and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.
 2. NPS 5/8 to NPS 2 (DN 18 to DN 50): Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.
 3. NPS 2-1/2 (DN 65) and Larger: Steel pipe, steel fittings, and welded or flanged joints.
 4. Steel pipe with malleable-iron fittings and threaded joints.
 5. Steel pipe with wrought-steel fittings and welded joints.
- 3.18 ABOVEGROUND MANUAL FUEL-OIL SHUTOFF VALVE SCHEDULE
 - A. Distribution piping valves for pipe NPS 2 (DN 50) and smaller shall be the following:
 1. Two-piece, full-port, bronze ball valves with bronze trim.
 - B. Distribution piping valves for pipe NPS 2-1/2 (DN 65) and larger shall be the following:
 1. Two-piece, full-port, bronze ball valves with bronze trim.
 - C. Valves in branch piping for single appliance shall be the following:
 1. Two-piece, full-port, bronze ball valves with bronze trim.

* * *

FACILITY NATURAL-GAS PIPING

Section 23 11 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fuel gas piping within the building. Products include the following:
 - 1. Pipe, tube, fittings, and joining materials.
 - 2. Protective pipe and fitting coating.
 - 3. Piping specialties.
 - 4. Specialty valves.
 - 5. Service meters.
 - 6. Pressure regulators.
- B. Related Sections include the following:
 - 1. Division 1 Section for LEED Requirements.
 - 2. Division 2 Section for Natural Gas Distribution for natural gas service piping, specialties, and accessories outside the building.

1.3 PROJECT CONDITIONS

- A. Gas System Pressures: Three pressure ranges. Primary pressure is more than 2.0 psig but not more than 50.0 psig, and is reduced to secondary pressures of more than 0.5 psig but not more than 10.0 psig, and is reduced again to pressures of 0.5 psig or less.
- B. Design values of fuel gas supplied for these systems are as follows:
 - 1. Nominal Heating Value: 1000 Btu/cu. ft.
 - 2. Nominal Specific Gravity: 0.6.
 - 3. Nominal Heating Value: 3200 Btu/cu. ft.
 - 4. Nominal Specific Gravity: 2.11.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Corrugated, stainless-steel tubing systems. Include associated components.
 - 2. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 3. Service-meter bars. Include service-meter size of selected models.
 - 4. Service meters. Include pressure rating and capacity of selected models.
 - 5. Service-meter bypass fittings.
 - 6. Pressure regulators. Include pressure rating, capacity, and settings of selected models.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: For fuel gas piping. Include plans and attachments to other work.
- D. Retain subparagraph below if equipment includes wiring.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- E. Welding certificates.
- F. Field quality-control test reports.
- G. Operation and Maintenance Data: For natural gas specialties and accessories to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. NFPA Standard: Comply with NFPA 54, "National Fuel Gas Code."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify fuel gas supplier. Handle

flammable liquids used by Installer with proper precautions and do not leave on premises from end of one day to beginning of next day.

1.7 COORDINATION

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 CORRUGATED, STAINLESS-STEEL TUBING SYSTEMS

- A. Description: Comply with AGA LC 1 and include the following:
 - 1. Tubing: Corrugated stainless steel with plastic jacket or coating.
 - 2. Fittings: Copper alloy with ends made to fit corrugated tubing. Include ends with threads according to ASME B1.20.1 if connection to threaded pipe or fittings is required.
 - 3. Striker Plates: Steel, designed to protect tubing from penetrations.
 - 4. Manifolds: Malleable iron or steel with protective coating. Include threaded connections according to ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
 - 5. Manufacturers:
 - a. OmegaFlex, Inc.
 - b. Titeflex Corp.
 - c. Tru-Flex Metal Hose Corp.
 - d. Ward Industries, Inc.

2.4 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

- A. Steel Pipe: ASTM A 53/A 53M; Type E or S; Grade B; black. Wall thickness of wrought-steel pipe shall comply with ASME B36.10M.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
 - 2. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
 - 3. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.
 - 4. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
 - 5. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
 - 6. Joint Compound and Tape: Suitable for natural gas.
 - 7. Steel Flanges and Flanged Fittings: ASME B16.5.
 - 8. Gasket Material: Thickness, material, and type suitable for natural gas.

2.5 PROTECTIVE COATING

- A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in contact with materials that may corrode the pipe.

2.6 PIPING SPECIALTIES

- A. Flexible Connectors: ANSI Z21.24, copper alloy.
- B. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.

2.7 SPECIALTY VALVES

- A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

- B. Valves, NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 - C. Appliance Connector Valves: ANSI Z21.15 and CSA International listed.
 - 1. Manufacturers:
 - a. Brass Craft Manufacturing Co.
 - b. Mueller Co.; Mueller Gas Products Div.
 - c. Watts Industries, Inc.; Water Products Div.
 - D. Gas Valves, NPS 2 and Smaller: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating.
 - 1. Manufacturers:
 - a. Milwaukee Valve Company.
 - b. NIBCO INC.
 - c. Red-White Valve Corp.
 - 2. Tamperproof Feature: Include design for locking.
 - E. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.
- Coordinate subparagraph and list below with Part 2 "Manufacturers".
- 1. Manufacturers:
 - a. Flow Control Equipment, Inc.
 - b. Milliken Valve Co., Inc.
 - c. Nordstrom Valves, Inc.
 - d. Olson Technologies, Inc.; Homestead Valve Div.
 - e. Walworth Co.
 - 2. Tamperproof Feature: Include design for locking.
- 2.8 SERVICE METERS (BY GAS UTILITY COMPANY)
- 2.9 PRESSURE REGULATORS
- A. Description: Single stage and suitable for fuel gas service. Include steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
 - 1. Manufacturers:
 - a. Service Pressure Regulators:
 - 1) American Meter Company.
 - 2) Fisher Controls International, Inc.; Division of Emerson.
 - 3) Invensys.
 - 4) National Meter Industries, Inc.
 - 5) Richards Industries, Inc.; Jordan Valve Div.
 - 6) Schlumberger Limited; Gas Div.
 - b. Line Pressure Regulators:
 - 1) American Meter Company.
 - 2) Donkin, Bryan RMG Canada, Ltd.
 - 3) Eclipse Combustion, Inc.
 - 4) Fisher Controls International, Inc.; Division of Emerson.
 - 5) Invensys.
 - 6) Maxitrol Company.
 - 7) National Meter Industries, Inc.
 - 8) Richards Industries, Inc.; Jordan Valve Div.
 - 9) Schlumberger Limited; Gas Div.
 - c. Appliance Pressure Regulators:
 - 1) Canadian Meter Co., Inc.
 - 2) Eaton Corporation; Controls Div.
 - 3) Harper Wyman Co.
 - 4) Maxitrol Company.
 - 5) SCP, Inc.
 - 2. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 3. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

4. Service Pressure Regulators: ANSI Z21.80. Include 100-psig- minimum inlet pressure rating.
 5. Line Pressure Regulators: ANSI Z21.80 with 2-psig- minimum inlet pressure rating.
 6. Line Pressure Regulators: ANSI Z21.80 with 10-psig inlet pressure rating, unless otherwise indicated.
 7. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
- B. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for fuel oil piping system to verify actual locations of piping connections before equipment installation.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

3.3 SERVICE-METER ASSEMBLY INSTALLATION (BY GAS UTILITY COMPANY)

3.4 SERVICE ENTRANCE PIPING

- A. Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.
1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.
 2. Natural gas distribution system piping, service pressure regulator, and service meter are specified in Division 2 Section for Natural Gas Distribution.
 3. LP-Gas distribution system piping is specified in Division 2 Section for Liquid Petroleum Gas Distribution.
- B. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service-meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting. Dielectric fittings are specified in Division 23 Sections for Basic Mechanical Materials and Methods.
- C. Install strainer upstream from each earthquake valve. Strainers are specified in Division 22 Sections for Plumbing Specialties.

3.5 PIPING APPLICATIONS

- A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.
- B. Fuel Gas Piping, 2 psig or Less:
1. NPS 1/2 and Smaller: NPS 3/4 steel pipe, malleable-iron threaded fittings, and threaded joints.
 - a. Option: Soft copper tube, copper fittings, and brazed joints may be used for runouts at individual appliances.
 2. NPS 3/4 and NPS 1: Steel pipe, malleable-iron threaded fittings, and threaded joints.
 - a. Option: Soft copper tube, copper fittings, and brazed joints may be used for runouts at individual appliances.
 3. NPS 1-1/4 to NPS 2: Steel pipe, steel welding fittings, and welded joints.
 4. NPS 2-1/2 to NPS 4 and Larger: Steel pipe, steel welding fittings, and welded joints.
- C. Fuel Gas Piping 2 to 5 psig:
1. NPS 4 and Larger: Steel pipe, steel welding fittings, and welded joints.
 2. Larger Than NPS 4: Steel pipe, steel welding fittings, and welded joints.
- D. Underground Fuel Gas Piping: Steel pipe, steel welding fittings, and welded joints. Encase in containment conduit.
- E. Containment Conduits: Steel pipe, steel welding fittings, and welded joints.
- F. Gas Service Piping at Meters and Regulators, More Than 5 psig: Steel pipe, steel welding fittings, and welded joints.

3.6 VALVE APPLICATIONS

- A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.
- B. Appliance Shutoff Valves for Pressure 0.5 to 2 psig: Gas stop or gas valve.
- C. Appliance Shutoff Valves for Pressure 2 to 5 psig: Gas valve.
- D. Piping Line Valves, NPS 2 and Smaller: Gas valve.
- E. Piping Line Valves, NPS 2-1/2 and Larger: Plug valve or general-duty valve.
- F. Valves at Service Meter, NPS 2 and Smaller: Gas valve.
- G. Valves at Service Meter, NPS 2-1/2 and Larger: Plug valve.

3.7 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 23 Sections for Basic Mechanical Materials and Methods.
- B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.
 - 1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
 - 2. In Floors: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in floors, subject to approval of authorities having jurisdiction. Surround piping cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
 - 3. In Floor Channels: Gas piping may be installed in floor channels, subject to approval of authorities having jurisdiction. Channels must have cover and be open to space above cover for ventilation.
 - 4. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
 - a. Exception: Tubing passing through partitions or walls.
 - 5. In Walls: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in masonry walls, subject to approval of authorities having jurisdiction.
 - 6. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - a. Exception: Accessible above-ceiling space specified above.
- C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.
- D. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels, unless indicated to be exposed to view.
- E. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- F. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- G. Connect branch piping from top or side of horizontal piping.
- H. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- I. Install corrugated, stainless-steel tubing system according to manufacturer's written instructions. Include striker plates to protect tubing from puncture where tubing is restrained and cannot move.

- J. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.
 - K. Install pressure gage upstream and downstream from each line pressure regulator. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."
 - L. Install flanges on valves, specialties, and equipment having NPS 2-1/2 and larger connections.
 - M. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.
 - N. Install containment conduits for gas piping below slabs, within building, in gastight conduits extending minimum of 4 inches outside building, and vented to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end. Prepare and paint outside of conduits with coal-tar, epoxy-polyamide paint according to SSPC-Paint 16.
- 3.8 JOINT CONSTRUCTION
- A. Basic piping joint construction is specified in Division 23 Sections for Basic Mechanical Materials and Methods.
 - B. Use materials suitable for fuel gas.
 - 1. Brazed Joints: Make with brazing alloy with melting point greater than 1000 deg F. Brazing alloys containing phosphorus are prohibited.
 - C. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- 3.9 HANGER AND SUPPORT INSTALLATION
- A. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
 - B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
 - 5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.
 - C. Install hangers for horizontal hard copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1/2 and NPS 5/8: Maximum span, 72 inches; minimum rod size, 3/8 inch.
 - 3. NPS 3/4 and NPS 7/8: Maximum span, 84 inches; minimum rod size, 3/8 inch.
 - 4. NPS 1: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - D. Install hangers for horizontal corrugated, stainless-steel tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/8 and NPS 1/2: Maximum span, 48 inches; minimum rod size, 3/8 inch.
 - 2. NPS 3/4 and NPS 1: Maximum span, 72 inches; minimum rod size, 3/8 inch.
 - 3. Option: Support tubing from structure according to manufacturer's written instructions.
- 3.10 CONNECTIONS
- A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.
 - B. Install piping adjacent to appliances to allow service and maintenance.
 - C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.
 - D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.
 - E. Ground equipment according to Division 26 Section for Grounding and Bonding.
 - 1. Do not use gas pipe as grounding electrode.
 - F. Connect wiring according to Division 26 Section for Conductors and Cables.
- 3.11 LABELING AND IDENTIFYING
- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each service meter, pressure regulator, and specialty valve.

1. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 2. Nameplates, pipe identification, and signs are specified in Division 23 Section "Identification for HVAC Piping and Equipment."
- 3.12 PAINTING
- A. Use materials and procedures in Division 9 painting Sections.
 - B. Paint exterior service meters, pressure regulators, and specialty valves.
 1. Color: Gray.
- 3.13 FIELD QUALITY CONTROL
- A. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.
 - B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.
 - C. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.
 - D. Verify correct pressure settings for pressure regulators.
 - E. Verify that specified piping tests are complete.

* * *

REFRIGERANT PIPING

Section 23 23 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes refrigerant piping used for air-conditioning applications.

1.3 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
 2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
 3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
 1. Shop Drawing Scale: 1/4 inch equals 1 foot (1:50).
 2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.8 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.9 COORDINATION

- A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 07 72 00 "Roof Accessories."

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L (ASTM B 88M, Type A or B).
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.
- F. Flexible Connectors:
 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.

2. End Connections: Socket ends.
 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
 4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 5. Maximum Operating Temperature: 250 deg F (121 deg C).
- 2.2 VALVES AND SPECIALTIES
- A. Diaphragm Packless Valves:
1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
 2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
 3. Operator: Rising stem and hand wheel.
 4. Seat: Nylon.
 5. End Connections: Socket, union, or flanged.
 6. Working Pressure Rating: 500 psig (3450 kPa).
 7. Maximum Operating Temperature: 275 deg F (135 deg C).
- B. Packed-Angle Valves:
1. Body and Bonnet: Forged brass or cast bronze.
 2. Packing: Molded stem, back seating, and replaceable under pressure.
 3. Operator: Rising stem.
 4. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
 5. Seal Cap: Forged-brass or valox hex cap.
 6. End Connections: Socket, union, threaded, or flanged.
 7. Working Pressure Rating: 500 psig (3450 kPa).
 8. Maximum Operating Temperature: 275 deg F (135 deg C).
- C. Check Valves:
1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
 2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
 3. Piston: Removable polytetrafluoroethylene seat.
 4. Closing Spring: Stainless steel.
 5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
 6. End Connections: Socket, union, threaded, or flanged.
 7. Maximum Opening Pressure: 0.50 psig (3.4 kPa).
 8. Working Pressure Rating: 500 psig (3450 kPa).
 9. Maximum Operating Temperature: 275 deg F (135 deg C).
- D. Service Valves:
1. Body: Forged brass with brass cap including key end to remove core.
 2. Core: Removable ball-type check valve with stainless-steel spring.
 3. Seat: Polytetrafluoroethylene.
 4. End Connections: Copper spring.
 5. Working Pressure Rating: 500 psig (3450 kPa).
- E. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.
1. Body and Bonnet: Plated steel.
 2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 3. Seat: Polytetrafluoroethylene.
 4. End Connections: Threaded.
 5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and [24] [115] [208]-V ac coil.
 6. Working Pressure Rating: 400 psig (2760 kPa).
 7. Maximum Operating Temperature: 240 deg F (116 deg C).
 8. Manual operator.
- F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
 2. Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Seat Disc: Polytetrafluoroethylene.

4. End Connections: Threaded.
 5. Working Pressure Rating: 400 psig (2760 kPa).
 6. Maximum Operating Temperature: 240 deg F (116 deg C).
- G. Thermostatic Expansion Valves: Comply with ARI 750.
1. Body, Bonnet, and Seal Cap: Forged brass or steel.
 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Packing and Gaskets: Non-asbestos.
 4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
 5. Suction Temperature: [40 deg F (4.4 deg C)] <Insert temperature>
 6. Superheat: [Adjustable] [Nonadjustable].
 7. Reverse-flow option (for heat-pump applications).
 8. End Connections: Socket, flare, or threaded union.
 9. Working Pressure Rating: [700 psig (4820 kPa)] [450 psig (3100 kPa)] <Insert value>
- H. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Packing and Gaskets: Non-asbestos.
 4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 5. Seat: Polytetrafluoroethylene.
 6. Equalizer: [Internal] [External].
 7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and [24] [115] [208] -V ac coil.
 8. End Connections: Socket.
 9. Set Pressure: <Insert psig (kPa).>
 10. Throttling Range: Maximum 5 psig (34 kPa).
 11. Working Pressure Rating: 500 psig (3450 kPa).
 12. Maximum Operating Temperature: 240 deg F (116 deg C).
- I. Straight-Type Strainers:
1. Body: Welded steel with corrosion-resistant coating.
 2. Screen: 100-mesh stainless steel.
 3. End Connections: Socket or flare.
 4. Working Pressure Rating: 500 psig (3450 kPa).
 5. Maximum Operating Temperature: 275 deg F (135 deg C).
- J. Angle-Type Strainers:
1. Body: Forged brass or cast bronze.
 2. Drain Plug: Brass hex plug.
 3. Screen: 100-mesh monel.
 4. End Connections: Socket or flare.
 5. Working Pressure Rating: 500 psig (3450 kPa).
 6. Maximum Operating Temperature: 275 deg F (135 deg C).
- K. Moisture/Liquid Indicators:
1. Body: Forged brass.
 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 3. Indicator: Color coded to show moisture content in ppm.
 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 5. End Connections: Socket or flare.
 6. Working Pressure Rating: 500 psig (3450 kPa).
 7. Maximum Operating Temperature: 240 deg F (116 deg C).
- L. Replaceable-Core Filter Dryers: Comply with ARI 730.
1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 3. Desiccant Media: Activated [alumina] [charcoal].

4. Designed for reverse flow (for heat-pump applications).
 5. End Connections: Socket.
 6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
 7. Maximum Pressure Loss: [2 psig (14 kPa)] <Insert value>.
 8. Rated Flow: <Insert tons (kW).>
 9. Working Pressure Rating: 500 psig (3450 kPa).
 10. Maximum Operating Temperature: 240 deg F (116 deg C).
- M. Permanent Filter Dryers: Comply with ARI 730.
1. Body and Cover: Painted-steel shell.
 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 3. Desiccant Media: Activated [alumina] [charcoal].
 4. Designed for reverse flow (for heat-pump applications).
 5. End Connections: Socket.
 6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
 7. Maximum Pressure Loss: [2 psig (14 kPa)] <Insert value>.
 8. Rated Flow: <Insert tons (kW).>
 9. Working Pressure Rating: 500 psig (3450 kPa).
 10. Maximum Operating Temperature: 240 deg F (116 deg C).
- N. Mufflers:
1. Body: Welded steel with corrosion-resistant coating.
 2. End Connections: Socket or flare.
 3. Working Pressure Rating: 500 psig (3450 kPa).
 4. Maximum Operating Temperature: 275 deg F (135 deg C).
- O. Receivers: Comply with ARI 495.
1. Retain first subparagraph below for receivers larger than 6 inches (150 mm).
 2. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 3. Comply with UL 207; listed and labeled by an NRTL.
 4. Body: Welded steel with corrosion-resistant coating.
 5. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
 6. End Connections: Socket or threaded.
 7. Working Pressure Rating: 500 psig (3450 kPa).
 8. Maximum Operating Temperature: 275 deg F (135 deg C).
- P. Liquid Accumulators: Comply with ARI 495.
1. Body: Welded steel with corrosion-resistant coating.
 2. End Connections: Socket or threaded.
 3. Working Pressure Rating: 500 psig (3450 kPa).
 4. Maximum Operating Temperature: 275 deg F (135 deg C).
- 2.3 REFRIGERANTS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Atofina Chemicals, Inc.
 2. DuPont Company; Fluorochemicals Div.
 3. Honeywell, Inc.; Genetron Refrigerants.
 4. INEOS Fluor Americas LLC.
- B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines NPS 1-1/2 (DN 40) and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

- B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR or L (B), annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- 3.2 PIPING INSTALLATION
- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Refer to Section 230900 "Instrumentation and Control for HVAC" and Section 230993 "Sequence of Operations for HVAC Controls" for solenoid valve controllers, control wiring, and sequence of operation.
- K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- M. Install refrigerant piping in protective conduit where installed belowground.
- N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- O. Slope refrigerant piping as follows:
1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 2. Install horizontal suction lines with a uniform slope downward to compressor.
 3. Install traps and double risers to entrain oil in vertical runs.
 4. Liquid lines may be installed level.
- P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- Q. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- R. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."
- S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."
- 3.3 PIPE JOINT CONSTRUCTION
- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
 - D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
 - E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
 - F. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 - G. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.
 - H. Welded Joints: Construct joints according to AWS D10.12/D10.12M.
 - I. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- 3.4 HANGERS AND SUPPORTS
- A. Hanger, support, and anchor products are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
 - B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
 - 2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
 - C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 - 2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 - 3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
 - 4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 - 5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 - D. Support multifloor vertical runs at least at each floor.
- 3.5 FIELD QUALITY CONTROL
- A. Perform tests and inspections and prepare test reports.
 - B. Tests and Inspections:
 - 1. Comply with ASME B31.5, Chapter VI.
 - 2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
 - 3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.

- b. System shall maintain test pressure at the manifold gage throughout duration of test.
- c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
- d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.6 SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter dryers after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
 - 4. Charge system with a new filter-dryer core in charging line.

3.7 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

* * *

METAL DUCTS

Section 23 31 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes rectangular, round, and flat-oval metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Related Sections include the following:
 - 1. Division 1 Section "LEED Requirements".
 - 2. Division 7 Sections "Joint Sealants" and "Firestopping" for fire-resistant sealants for use around duct penetrations and fire-damper installations in fire-rated floors, partitions, and walls.
 - 3. Division 23 Section "Duct Insulation" for duct insulation.
 - 4. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
 - 5. Division 23 Section "Air Terminal Units" for constant-volume and variable-air-volume control boxes, and reheat boxes.
 - 6. Division 23 Section "Diffusers, Registers, and Grilles."
 - 7. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for air balancing and final adjusting of manual-volume dampers.

1.3 DEFINITIONS

- A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula $Btu \times in./h \times sq. ft. \times deg F$ or $W/m \times K$ at the temperature differences specified. Values are expressed as Btu or W.
 - 1. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037.

1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.

1.5 SUBMITTALS

- A. Product Data: For duct liner and sealing materials.
- B. Shop Drawings: Show details of the following:
 - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 2. Duct layout indicating pressure classifications and sizes on plans.
 - 3. Fittings.
 - 4. Reinforcement and spacing.
 - 5. Seam and joint construction.
 - 6. Penetrations through fire-rated and other partitions.
 - 7. Terminal unit, and coil, installations.
 - 8. Hangers and supports, including methods for building attachment, vibration isolation, seismic restraints, and duct attachment.
- C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension assembly members.
 2. Other systems installed in same space as ducts.
 3. Ceiling- and wall-mounted access doors and panels required to provide access to dampers and other operating devices.
 4. Coordination with ceiling-mounted items, including lighting fixtures, diffusers, grilles, speakers, sprinkler heads, access panels, and special moldings.
- D. Welding Certificates: Copies of certificates indicating welding procedures and personnel comply with requirements in "Quality Assurance" Article.
- E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- F. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

1.6 QUALITY ASSURANCE

- A. Welding Standards: Qualify welding procedures and welding personnel to perform welding processes for this Project according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members; and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.
- C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle sealant and firestopping materials according to manufacturer's written recommendations.
- C. Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards—Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 DUCT LINER

- A. General: Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard."
1. Manufacturers:
 - a. CertainTeed Corp.; Insulation Group.

- b. Johns Manville International, Inc.
 - c. Knauf Fiber Glass GmbH.
- B. Materials: ASTM C 1071 with coated surface exposed to airstream to prevent erosion of glass fibers.
- 1. Thickness: 1 inch (inside).
 - 2. Thickness: 1-1/2 inches (outdoors).
 - 3. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
 - 4. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM C 411.
 - 5. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
 - 6. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - a. Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.
 - b. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
 - c. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.4 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
- 1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
 - 2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
 - 3. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
 - 4. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.5 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.
- 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
- 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
 - 2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
- 1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
 - 3. Supports for Aluminum Ducts: Aluminum support materials, unless materials are electrolytically separated from ductwork.

2.6 RECTANGULAR DUCT FABRICATION

- A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction

Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
 2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
- B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness reinforcement size and spacing and joint reinforcement.
1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Nexus, Inc.
 - c. Ward Industries, Inc.
- C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Lockformer.
- D. Duct Size: Maximum 30-inches wide and up to 2-inch wg pressure class.
- E. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.
- F. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.

2.7 SHOP APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with 90 percent coverage of adhesive at liner contact surface area. Multiple layers of insulation to achieve indicated thickness are prohibited.
- B. Apply adhesive to liner facing in direction of airflow not receiving metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liners in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
- G. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely around perimeter; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
- H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profile or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 1. Fan discharge.
 2. Intervals of lined duct preceding unlined duct.
 3. Upstream edges of transverse joints in ducts.
- I. Secure insulation liner with perforated sheet metal liner of same metal thickness as specified for duct, secured to ducts with mechanical fasteners that maintain metal liner distance from duct without compressing insulation.
 1. Sheet Metal Liner Perforations: 3/32-inch diameter, with an overall open area of 23 percent.
- J. Terminate liner with duct buildouts installed in ducts to attach dampers, turning vane assemblies, and other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct wall with bolts, screws, rivets, or welds. Terminate liner at fire dampers at connection to fire-damper sleeve.

2.8 ROUND AND FLAT-OVAL DUCT FABRICATION

- A. General: Diameter as applied to flat-oval ducts in this Article is the diameter of the size of round duct that has a circumference equal to perimeter of a given size of flat-oval duct.
- B. Round Longitudinal- and Spiral Lock Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- C. Flat-Oval, Longitudinal- and Spiral Lock Seam Ducts: Fabricate supply ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Fabricate ducts larger than 72-inches in diameter with butt-welded longitudinal seams.
 - 1. Manufacturers:
 - a. McGill AirFlow Corporation.
 - b. SEMCO Incorporated.

2.9 ROUND AND FLAT-OVAL DUCT FITTING FABRICATION

- A. Ducts up to 20-inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
- B. Ducts 21 to 72-inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
- C. Ducts Larger than 72-inches in Diameter: Companion angle flanges joints per SMACNA "HVAC Duct Construction Standards—Metal and Flexible," Figure 3-2.
- D. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
 - 1. Manufacturers:
 - a. Lindab Inc.
- E. Flat-Oval Ducts: Prefabricated connection system consisting of two flanges and one synthetic rubber gasket.
 - 1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. McGill AirFlow Corporation.
 - c. SEMCO Incorporated.
- F. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.
- G. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.
- H. Elbows: Fabricate in die-formed, gored, pleated, or mitered construction. Fabricate bend radius of die-formed, gored, and pleated elbows one and one-half times elbow diameter. Unless elbow construction type is indicated, fabricate elbows as follows:
 - 1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
 - 2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg:
 - a. Ducts 3 to 26 Inches in Diameter: 0.028 inch.
 - b. Ducts 27 to 36 Inches in Diameter: 0.034 inch.
 - c. Ducts 37 to 50 Inches in Diameter: 0.040 inch.
 - d. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
 - e. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
 - 3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:
 - a. Ducts 3 to 14 Inches in Diameter: 0.028 inch.
 - b. Ducts 15 to 26 Inches in Diameter: 0.034 inch.
 - c. Ducts 27 to 50 Inches in Diameter: 0.040 inch.
 - d. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
 - e. Ducts 62 to 84 Inches in Diameter: 0.064 inch.

4. Flat-Oval Mitered Elbows: Welded construction with same metal thickness as longitudinal seam flat-oval duct.
5. 90-Degree, Two-Piece, Mitered Elbows: Use only for supply systems, or exhaust systems for material-handling classes A and B; and only where space restrictions do not permit using 1.5 bend radius elbows. Fabricate with single-thickness turning vanes.
6. Round Elbows, 8 Inches and Smaller: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
7. Round Elbows, 9 through 14 Inches: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees, unless space restrictions require a mitered elbow. Fabricate nonstandard bend-angle configuration or nonstandard diameter elbows with gored construction.
8. Round Elbows, Larger Than 14 Inches, and All Flat-Oval Elbows: Fabricate gored elbows, unless space restrictions require a mitered elbow.
9. Die-Formed Elbows for Sizes through 8 Inches and All Pressures: 0.040 inch thick with two-piece welded construction.
10. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.
11. Flat-Oval Elbow Metal Thickness: Same as longitudinal seam flat-oval duct specified above.
12. Pleated Elbows for Sizes through 14 Inches and Pressures through 10-Inch wg: 0.022 inch.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

- A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
 1. Supply Ducts (before Air Terminal Units): 4-inch wg.
 2. Supply Ducts (after Air Terminal Units): 2-inch wg.
 3. Return Ducts (Negative Pressure): 2-inch wg.
 4. Exhaust Ducts (Negative Pressure): 2-inch wg.
- B. All ducts shall be galvanized steel.

3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards—Metal and Flexible," unless otherwise indicated.
- B. Install round and flat-oval ducts in lengths not less than 12 feet, unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, changes in size and shape, and connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct.
- F. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.
- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and

duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches.

- M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section "Air Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."
- N. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes. Refer to SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
- O. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction".
- P. Paint interiors of metal ducts, that do not have duct liner, for 24-inches upstream of registers and grilles. Apply one coat of flat black, latex finish coat over a compatible galvanized-steel primer. Paint materials and application requirements are specified Division 9 painting Sections.

3.3 SEAM AND JOINT SEALING

- A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Pressure Classification Less Than 2-Inch wg: Transverse joints.
- C. Seal externally insulated ducts before insulation installation.

3.4 HANGING AND SUPPORTING

- A. Install rigid round, rectangular, and flat-oval metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- C. Support vertical ducts at a maximum interval of 16 feet and at each floor.
- D. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- E. Install concrete inserts before placing concrete.
- F. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3.5 CONNECTIONS

- A. Connect equipment with flexible connectors according to Division 23 Section "Air Duct Accessories."
- B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

3.6 FIELD QUALITY CONTROL

- A. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.
- B. Conduct tests, in presence of Engineer, at static pressures equal to maximum design pressure of system or section being tested. If pressure classifications are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
- C. Determine leakage from entire system or section of system by relating leakage to surface area of test section.
 - 1. Allowable Leakage, Supply Duct System: 2 percent of design airflow.
 - 2. Allowable Leakage, Exhaust Duct System: 2 percent of design airflow.
 - 3. Allowable Leakage, Supply Duct Systems, Terminal to Air Outlets: 2 percent of design airflow.
- D. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 3 for round and flat-oval ducts, Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg (both positive and negative pressures), and Leakage Classification 6 for pressure classifications from 2- to 10-inch wg.
- E. Remake leaking joints and retest until leakage is less than maximum allowable.

- F. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."

3.7 ADJUSTING

- A. Adjust volume-control dampers in ducts, outlets, and inlets to achieve design airflow.
- B. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for detailed procedures.

3.8 CLEANING

- A. Mark position of dampers and air-directional mechanical devices before cleaning, and perform cleaning before air balancing.
- B. Use service openings, as required, for physical and mechanical entry and for inspection.
 - 1. Create other openings to comply with duct standards.
 - 2. Disconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling sections to gain access during the cleaning process.
- C. Vent vacuuming system to the outside. Include filtration to contain debris removed from HVAC systems, and locate exhaust down wind and away from air intakes and other points of entry into building.
- D. Clean the following metal duct systems by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, and actuators except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
- E. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet.
 - 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
- F. Cleanliness Verification:
 - 1. Visually inspect metal ducts for contaminants.
 - 2. Where contaminants are discovered, re-clean and reinspect ducts.

* * *

AIR DUCT ACCESSORIES

Section 23 33 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire smoke dampers.
 - 4. Turning vanes.
 - 5. Duct-mounted access doors and panels.
 - 6. Flexible ducts.
 - 7. Flexible connectors.
 - 8. Duct accessory hardware.
- B. Related Sections include the following:
 - 1. Division 1 Section for LEED Requirements.
 - 2. Division 8 Section for wall- and ceiling-mounted access doors and panels.
 - 3. Division 23 Section "Air Terminals Units" for constant-volume and variable-air-volume control boxes, and reheat boxes.
 - 4. Division 23 Section "Diffusers, Registers, and Grilles."
 - 5. Division 23 Section "Instrumentation and Controls for HVAC" for electric and pneumatic damper actuators.
 - 6. Division 26 Section for duct-mounted fire smoke detectors.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Backdraft dampers.
 - 2. Manual-volume dampers.
 - 3. Fire smoke dampers.
 - 4. Duct-mounted access doors and panels.
 - 5. Flexible ducts.
 - 6. Turning vanes.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:
 - 1. Special fittings and manual- and automatic-volume-damper installations.
 - 2. Fire- and smoke-damper installations, including sleeves and duct-mounted access doors and panels.
- D. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with the following NFPA standards:
 - 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.
- B. Extruded Aluminum: ASTM B 221, Alloy 6063, Temper T6.
- C. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT DAMPERS

- A. Description: Suitable for horizontal or vertical installations.
- B. Frame: 0.052-inch- thick, galvanized, sheet steel, with welded corners and mounting flange.
- C. Blades: 0.050-inch- thick aluminum sheet.
- D. Blade Seals: Neoprene.
- E. Blade Axles: Galvanized steel.
- F. Tie Bars and Brackets: Galvanized steel.
- G. Return Spring: Adjustable tension.

2.3 MANUAL-VOLUME DAMPERS

- A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classifications of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Low-Leakage Volume Dampers: Multiple- or single-blade, opposed-blade design as indicated, low-leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized, sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized, sheet steel.
 - 3. Blade Seals: Neoprene.
 - 4. Blade Axles: Galvanized steel.
 - 5. Tie Bars and Brackets: Galvanized steel.
- C. Jackshaft: 1-inch- diameter, galvanized steel pipe rotating within a pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper of a multiple-damper assembly.
- D. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.4 FIRE SMOKE DAMPERS

- A. General: Labeled to UL 555S. Combination fire and smoke dampers shall be labeled for one-and-one-half-hour rating to UL 555.
- B. Fusible Link: Replaceable, 165 or 212 deg F rated as indicated.
- C. Frame and Blades: 0.064-inch- thick, galvanized, sheet steel.
- D. Mounting Sleeve: Factory-installed, 0.052-inch- thick, galvanized, sheet steel; length to suit wall or floor application.
- E. Damper Motors: Provide for two-position action.
 - 1. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.

2. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
3. Outdoor Motors and Motors in Outside-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
4. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.

2.5 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch- wide, curved blades set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into side strips suitable for mounting in ducts.
- C. Acoustic Turning Vanes: Fabricate of airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.6 DUCT-MOUNTED ACCESS DOORS AND PANELS

- A. General: Fabricate doors and panels airtight and suitable for duct pressure class.
- B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
- C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.7 FLEXIBLE CONNECTORS

- A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized, sheet.
- C. Transverse Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 4-3/8-inch- wide, 0.028-inch- thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.
- D. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.
 1. Minimum Weight: 26 oz./sq. yd..
 2. Tensile Strength: 480 lbf/inch in the warp, and 360 lbf/inch in the filling.
- E. Conventional, Outdoor System Flexible Connector Fabric: Glass fabric double coated with a synthetic-rubber, weatherproof coating resistant to the sun's ultraviolet rays and ozone environment.
 1. Minimum Weight: 26 oz./sq. yd..
 2. Tensile Strength: 530 lbf/inch in the warp, and 440 lbf/inch in the filling.
- F. High-Corrosive-Environment System Flexible Connectors: Glass fabric coated with a chemical-resistant coating.
 1. Minimum Weight: 14 oz./sq. yd..
 2. Tensile Strength: 450 lbf/inch in the warp, and 340 lbf/inch in the filling.

2.8 FLEXIBLE DUCTS

- A. General: Comply with UL 181, Class 1.
- B. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch- thick, glass-fiber insulation around a continuous inner liner.
 1. Reinforcement: Steel-wire helix encapsulated in inner liner.

2. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.
 3. Inner Liner: Polyethylene film.
 - C. Pressure Rating: 6-inch wg positive, 1/2-inch wg negative.
- 2.9 ACCESSORY HARDWARE
- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.
 - B. Splitter Damper Accessories: Zinc-plated damper blade bracket; 1/4-inch, zinc-plated operating rod; and a duct-mounted, ball-joint bracket with flat rubber gasket and square-head set screw.
 - C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.
 - D. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.
- B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.
- C. Provide test holes at fan inlet and outlet and elsewhere as indicated.
- D. Install fire smoke dampers according to manufacturer's UL-approved written instructions.
- E. Install fusible links in fire smoke dampers.
- F. Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
 1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
 2. Install access panels on side of duct where adequate clearance is available.
- G. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment."
- H. Install turning vanes in 90° rectangular elbows.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

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CENTRIFUGAL HVAC FANS

Section 23 34 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Utility set fans.
2. Centrifugal roof ventilators.
3. In-line centrifugal fans.
4. Kitchen hood.
5. Powered Air Filtration Units

- B. Related Sections include the following:

1. Division 1 Section "LEED Requirements".
2. Division 1 Section 01 91 00 "General Commissioning Requirements"
3. Division 23 Section 23 08 00 "Commissioning of HVAC Systems"

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on sea level.
- B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.
8. Air Filters for powered air filtration unit.

- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.

- C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

- D. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

- E. Field quality-control test reports.

- F. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.7 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.1 UTILITY SET FANS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Acme Engineering & MFG Corp.
 - 2. Greenheck.
 - 3. Loren Cook Company.
 - 4. Penn Ventilation.
- C. Description: Belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.
- D. Housing: Fabricated of galvanized steel with side sheets fastened with a deep lock seam or welded to scroll sheets.
 - 1. Vertical Discharge Arrangement: Adjustable to eight standard positions.
- E. Fan Wheels: Single-width, single inlet; welded to cast-iron or cast-steel hub and spun-steel inlet cone, with hub keyed to shaft.
 - 1. Blade Materials: Aluminum.
 - 2. Blade Type: Backward inclined.
- F. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
- G. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings with ABMA 9, L₁₀ of 100,000 hours.
- H. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - 1. Service Factor Based on Fan Motor Size: 1.5.
 - 2. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - 3. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - 4. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.

- I. Direct-Driven Units: Motor resiliently mounted to housing, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.
 - J. Accessories:
 - 1. Variable-Speed Controller with all direct drive fans: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Inlet and Outlet: Flanged.
 - 3. Companion Flanges: Rolled flanges for duct connections of same material as housing.
 - 4. Backdraft Dampers: Gravity actuated with counterweight and interlocking aluminum blades with felt edges in steel frame installed on fan discharge.
 - 5. Access Door: Gasketed door in scroll with latch-type handles.
 - 6. Drain Connections (For rain and grease): NPS $\frac{3}{4}$ threaded coupling drain connection installed at lowest point of housing.
 - K. Coatings: Electrostatically applied polyester powder coating.
- 2.2 CENTRIFUGAL ROOF VENTILATORS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Acme Engineering & Mfg. Corp.
 - 2. Greenheck.
 - 3. Loren Cook Company.
 - 4. Penn Ventilation.
 - C. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
 - D. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
 - 2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
 - E. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
 - F. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
 - 1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 4. Fan and motor isolated from exhaust airstream.
 - G. Direct-Driven Units: Motor resiliently mounted to housing, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.
 - H. Accessories:
 - 1. Variable-Speed Controller with all direct drive fans: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 - 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 - 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 - 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 - I. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
 - 1. Configuration: Self-flashing without a cant strip, with mounting flange.
 - 2. Overall Height: 12 inches.
 - 3. Sound Curb: Curb with sound-absorbing insulation matrix.
 - 4. Pitch Mounting: Manufacture curb for roof slope.

5. Metal Liner: Galvanized steel.
- 2.3 IN-LINE CENTRIFUGAL FANS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Greenheck.
 2. Loren Cook Company.
 3. Penn Ventilation.
- C. Description: In-line, direct or belt-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
- D. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- E. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
- F. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.
- G. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
- H. Accessories:
1. Variable-Speed Controller with all direct drive fans: Solid-state control to reduce speed from 100 to less than 50 percent.
 2. Backdraft Dampers: Gravity actuated with counterweight and interlocking aluminum blades with felt edges in steel frame installed on fan discharge.
 3. Companion Flanges: For inlet and outlet duct connections.
 4. Fan Guards: 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
 5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.
- 2.4 KITCHEN HOOD
- A. Manufacturers: Subject to compliance with, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with, provide products the product indicated on the Drawings or a comparable product by one of the following:
1. Bluestar Pro-Line
- C. Description: Commercial grade 18 gauge 300 stainless steel construction, welded seamless construction, dishwasher safe stainless steel baffle filters, variable blower control, halogen lamps with dimmer control, reversible top exhaust, color (per architect).
- D. Accessories:
1. Internal blower kit
 2. Discharge duct transition
- 2.5 POWERED AIR FILTRATION UNIT
- A. Manufacturers: Subject to compliance with, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with, provide products the product indicated on the Drawings or a comparable product by one of the following:
1. Airmation
- C. Description: 300 directional louvers – Baffle Box, positive seal full frame gasketing, 4 eye bolts (for suspension), electrical cord – 12', heavy duty 16 ga. steel cabinet, pressure sensing switch, direct drive dual inlet blower mfg. rated @ 3000 CFM, carbon/alumina blend V-Blank cell, high efficiency V-bank particle MERV 16 filter, pleated MERV 8 pre-filter, flanged auto-roll housing, perforated steel screen, synthetic polyester auto-roll media, auto-roll tube enclosure, auto-roll take-up spool, pressure probe for roll media, removable collection tray, subfractional indexing motor, 180° side loading access door – either side, chemical resistant epoxy finish, probe port for air switch, 4 way rear exhaust grille, illuminated "on" circuit breaker, filter change indicator light, slide-in filter tracks, timer box for auto-roll, auto-roll advance light, left or right side filter access door, quiet operation (<60 DB), regulatory compliance.

- D. Accessories:
 - 1. Auto-Roll media
 - 2. Time Control Maintenance Monitor
- 2.6 MOTORS
 - A. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - B. Enclosure Type: Totally enclosed, fan cooled.
- 2.7 SOURCE QUALITY CONTROL
 - A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
 - B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

- 3.1 INSTALLATION
 - A. Install power ventilators level and plumb.
 - B. Support utility set exhaust fans using 2" deflection restrained spring isolators and other fans using restrained elastomeric mounts. Vibration- and seismic-control devices are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
 - 1. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.
 - C. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 7 Section "Roof Accessories" for installation of roof curbs.
 - D. Install units with clearances for service and maintenance.
 - E. Label units according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment."
- 3.2 CONNECTIONS
 - A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."
 - B. Install ducts adjacent to power ventilators to allow service and maintenance.
 - C. Ground equipment according to Division 26 Section for Grounding and Bonding."
 - D. Connect wiring according to Division 26 Section for Conductors and Cables."
- 3.3 FIELD QUALITY CONTROL
 - A. Perform the following field tests and inspections and prepare test reports:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 5. Adjust belt tension.
 - 6. Adjust damper linkages for proper damper operation.
 - 7. Verify lubrication for bearings and other moving parts.
 - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - 10. Shut unit down and reconnect automatic temperature-control operators.
 - 11. Remove and replace malfunctioning units and retest as specified above.

- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- 3.4 ADJUSTING
- A. Adjust damper linkages for proper damper operation.
 - B. Adjust belt tension.
 - C. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
 - D. Replace fan and motor pulleys as required to achieve design airflow.
 - E. Lubricate bearings.

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DIFFUSERS, REGISTERS AND GRILLES Section 23 37 13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.
- B. Related Sections include the following:
 - 1. Division 1 Section "LEED Requirements".
 - 2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.
 - 3. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for balancing diffusers, registers, and grilles.

1.3 DEFINITIONS

- A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
- C. Register: A combination grille and damper assembly over an air opening.

1.4 SUBMITTALS

- A. Product Data: For each model indicated, include the following:
 - 1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
 - 2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
 - 3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
 - 4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Coordination Drawings: Reflected ceiling plans and wall elevations drawn to scale to show locations and coordination of diffusers, registers, and grilles with other items installed in ceilings and walls.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Diffusers, registers, and grilles are scheduled at the end of this Section.

2.2 SOURCE QUALITY CONTROL

- A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Engineer for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

3.5 DIFFUSER, REGISTER AND GRILLE SCHEDULE

- A. Lay in Ceiling Diffuser:
 - 1. Products: Subject to compliance with requirements, modular removable core, 4 core, provide one of the following:
 - a. Air Systems Components; Krueger Div.
 - b. Anemostat Products; Dynamics Corp. of America.
 - c. Titus.
 - d. Price.
 - 2. Material: Steel.
 - 3. Finish: Baked enamel, white.
 - 4. Duct Connection: Round. or Square.
 - 5. Duct Connection Size: As shown on drawings.
 - 6. Face Size: 24" x 24."
 - 7. Maximum Noise-Criterion Rating: NC20.
 - 8. Face Style: Square. Perforated.
 - 9. Mounting: Lay in.
 - 10. Pattern: Adjustable.
 - 11. Dampers: Opposed blade.
- B. Hard Ceiling or Duct Mount Diffusers: Is the same as lay in ceiling diffusers except:
 - 1. Face Size: Frame size required for duct connection size.
 - 2. Face Style: Square.
 - 3. Mounting: Surface mount.
 - 4. Accessories: Provide frames style to match mounting style.
- C. Sidewall Supply Register:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Air Systems Components; Krueger Div.
 - b. Anemostat Products; Dynamics Corp. of America.
 - c. Titus.

- d. Price.
- 2. Material: Steel.
- 3. Finish: Baked enamel, white.
- 4. Face Blade Arrangement: Adjustable vertical.
- 5. Rear Blade Arrangement: Adjustable horizontal.
- 6. Frame: 1 inch wide.
- 7. Mounting: Concealed.
- 8. Damper Type: Adjustable opposed-blade assembly.
- 9. Accessories: Provide frame style to match mounting surface.
- D. Sidewall/Hard Ceiling: Return or Exhaust register is the same as sidewall supply register except square or rectangular face style and fixed horizontal single face blade.
- E. Layin ceiling return or exhaust register is same as lay in ceiling diffuser except without adjustable pattern and removable core.

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BREECHINGS, CHIMNEYS AND STACKS Section 23 51 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Listed double-wall vents.
- B. Related sections include the following:
 - 2. Division 1 Section "LEED Requirements".

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Type B and BW vents.
 - 2. Special gas vents.
 - 3. Guy wires and connectors.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers and seismic restraints, and location and size of each field connection.
 - 2. For installed products indicated to comply with design loads, include calculations required for selecting seismic restraints and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Welding certificates.
- E. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.
- B. Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents, breechings, and stacks.
- C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, structural failures caused by expansion and contraction.
- B. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 LISTED TYPE B AND BW VENTS

- A. Manufacturers:
 - 1. American Metal Products; MASCO Corporation.
 - 2. Heat-Fab Inc.
 - 3. Metal-Fab, Inc.
 - 4. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
- B. Description: Double-wall metal vents tested according to UL 441 and rated for 480 deg F continuously for Type B, or 550 deg F continuously for Type BW; with neutral or negative flue pressure complying with NFPA 211 and suitable for certified gas-fired appliances.
- C. Construction: Inner shell and outer jacket separated by at least a 1/4-inch airspace.
- D. Inner Shell: ASTM A 666, Type 430 stainless steel.
- E. Outer Jacket: Aluminized steel.
- F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - 1. Termination: Stack cap designed to exclude 90 percent of rainfall.

2.3 GUYING AND BRACING MATERIALS

- A. Cable: Three 1/8 inch diameter plastic coated aircraft cable:
- B. Pipe: Three galvanized steel, NPS 1-1/4.
- C. Angle Iron: Three galvanized steel, 2 by 2 by 0.25 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF LISTED VENTS AND CHIMNEYS

- A. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
- B. Seal between sections of positive-pressure vents according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
- C. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- D. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.
- E. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
- F. Erect stacks plumb to finished tolerance of no more than 1 inch out of plumb from top to bottom.

3.3 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

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SPLIT-SYSTEM AIR-CONDITIONERS

Section 23 81 26

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.
- B. Related Sections include the following:
 - 1. Division 1 Section "LEED Requirements".
 - 2. Division 01 Section 01 91 00 "General Commissioning Requirements."
 - 3. Division 23 Section 23 08 00 "Commissioning of HVAC Systems."

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. LEED Submittals: Provide cost data breakdown, recycle content and manufacturer name and location.
- C. Shop Drawings: Diagram power, signal, and control wiring.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- F. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- E. Units shall be designed to operate with HCFC-free refrigerants.

1.5 COORDINATION

- A. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 7 Section "Roof Accessories."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion on compressors and coils, and one year on parts.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set of filters for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carrier Air Conditioning; Div. of Carrier Corporation.
 2. Trane Company (The); Unitary Products Group.
 3. York International Corp.

2.2 EXPOSED EVAPORATOR-FAN COMPONENTS

- A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
1. Insulation: Faced, glass-fiber duct liner.
 2. Drain Pans: Galvanized steel, with connection for drain; insulated.
 3. Ductless unit with finished enclosure exposed in room, adjustable deflection supply grille, return grille and wall mount or suspended support brackets.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
- D. Fan Motors: Comply with requirements in 23 Section "Common Motor Requirements for HVAC Equipment."
1. Special Motor Features: Multi-tapped, variable speed with internal thermal protection and permanent lubrication.
- E. Disposable Filters: 1 inch thick, in fiberboard frames.
- F. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.3 Concealed Evaporator-Fan Components:

- A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
- B. Insulation: Faced, glass-fiber duct liner.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
- D. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm); leak tested to 300 psig (2070 kPa) underwater; with a two-position control valve.
- E. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
- F. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
- G. Fan Motors:
1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 2. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 3. Three-phase, permanently lubricated, ball-bearing motors with built-in thermal-overload protection.
 4. Wiring Terminations: Connect motor to chassis wiring with plug connection.
- H. ASHRAE compliance in "Airstream Surfaces" Subparagraph below may be required to comply with Project requirements or authorities having jurisdiction. Retain first subparagraph to comply with LEED Prerequisite IEQ 1.
- I. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- J. Filters: Permanent, cleanable.
- K. Condensate Drain Pans: Provide factory supplied drainable condensate drain pan with connection at lowest point of pan.

2.4 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

- A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1. Compressor Type: Reciprocating.
 - 2. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - 3. Refrigerant Charge: R-410a or 407c.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Fan: Aluminum-propeller type, directly connected to motor.
- E. Motor: Permanently lubricated, with integral thermal-overload protection.
- F. Low Ambient Kit: Permits operation down to 45 deg F.

2.5 ACCESSORIES

- A. Control equipment and sequence of operation are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."
- B. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install roof-mounting compressor-condenser components on equipment supports specified in Division 7 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- D. Install seismic restraints.
- E. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch. Refer to Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
- F. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
- G. At mechanical units, filters need to be easily accessible, i.e. hangers cannot interfere with accessibility.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 sections. Drawings indicate general arrangement of piping, fittings and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Ground equipment according to Division 26.
- D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.
- 3.4 STARTUP SERVICE
 - A. Engage a factory-authorized service representative to perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.
- 3.5 DEMONSTRATION
 - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1 Section "Closeout Procedures."

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VARIABLE REFRIGERANT AIR CONDITIONING SYSTEM Section 23 81 27

PART 1 – GENERAL

1.1 SYSTEM DESCRIPTION

- A. The variable capacity, heat pump or heat recovery air conditioning system shall consist of multiple evaporators, a refrigeration distribution system using PID controls, branch selector boxes, and outdoor units. The outdoor unit shall be a direct expansion (DX), air-cooled heat pump or heat-recovery (as indicated on the plans), multi-zone air-conditioning system with variable speed driven compressors using R-410A refrigerant. All zones shall be capable of operating separately with individual temperature controls.
- B. Operation of the system shall permit either cooling or heating of all of the fan coil units. Each fan coil or group of fan coils shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface as specified.

1.2 REQUIRED FEATURES

- A. Autocharging – Each system shall have a refrigerant auto-charging function.
- B. Charge Checking – Each system shall have a refrigerant charge checking function.
- C. Defrost Heating – Each system shall maintain continuous heating during defrost operation.
- D. Independent Control – Each fan coil shall use a dedicated electronic expansion valve for independent control.
- E. VFD Inverter Control – Each condensing unit shall use a high efficiency, variable speed “inverter” compressor coupled with inverter fan motors for superior part load performance.
- F. Compressor capacity shall be modulated automatically to maintain a constant suction pressure, while varying the refrigerant volume for the needs of the cooling or heating loads.
- G. Indoor fan coil units shall use PID control to control superheat and maintain the temperature setpoint within +/- 1°F.
- H. Condensing units shall be provided with a fan/fan motor ESP up to 0.32” WG as standard to allow connection of discharge ductwork and to prevent discharge air short circuiting.
- I. Advanced Diagnostics – Systems shall include a self diagnostic, auto-check function to detect a malfunction and display the type and location.

1.3 QUALITY ASSURANCE

- A. The units shall be listed by Electrical Laboratories (ETL) and bear the cETL label.
- B. All wiring shall be in accordance with the National Electric Code (NEC).
- C. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
- D. The outdoor unit will be factory charged with R410A.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be stored and handled according to the manufacturer's recommendations.

PART 2 – WARRANTY

2.1 WARRANTY

- A. The units shall have a standard manufacturer's warranty for a period of 10 years from date of installation. The units shall have a limited labor warranty for a period of one (1) year from date of installation. All warranty service work shall be performed by factory trained service professionals.

2.2 INSTALLATION REQUIREMENTS

- A. The system must be installed by a factory trained contractor. The bidders shall be required to submit training certification proof with bid documents. The mechanical contractor's installation price shall be based on the systems installation requirements. The mechanical contractor bids with complete knowledge of the HVAC system requirements.

PART 3 – PERFORMANCE

3.1 DESIGN BASIS

- A. The HVAC equipment basis of design is Daikin AC. Alternate manufacturers would be Mitsubishi and Sanyo. The system is a heat recovery variable refrigerant volume system allowing simultaneous heating and cooling. Other manufacturers that quote this project shall furnish the minimum system standards as defined by the base bid model numbers, model families or as otherwise specified herein (see General Specifications and Alternate Supplier Checklist in particular). In any event, the contractor shall be responsible for all specified items and intents of this document without further compensation. Contractor shall be financially responsible for all costs associated with the substitution, including, but not limited to review, re-engineering, work of other trades, etc.

PART 4 – PRODUCTS

4.1 OUTDOOR UNIT

- A. General:
 - 1. The outdoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. The refrigeration circuit of the condensing unit shall consist of scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
 - 2. High/low pressure gas line, liquid and suction lines must be individually insulated between the outdoor and indoor units.
 - 3. The sound pressure level shall be 63 dBA or less at 3 feet from the front of the unit.
 - 4. The system will automatically restart operation after a power failure and will retain all settings, eliminating the need for reprogramming.
 - 5. The unit shall incorporate an auto-charging feature and a refrigerant charge check function.
 - 6. The following safety devices shall be included on the condensing unit; high pressure switch, control circuit fuses, crankcase heaters, fusible plug, high pressure switch, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
 - 7. To ensure the liquid refrigerant does not flash when supplying to the various fan coil units, the circuit shall be provided with a sub-cooling feature.
 - 8. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation.
 - 9. The outdoor unit shall be capable of heating operation at 0°F dry bulb ambient temperature without additional low ambient controls.
 - 10. The system shall continue to provide heat to the indoor units while in the defrost mode. Alternately, the contractor must provide electric strip heat with controls for each of the fan coil units which energizes during this mode.
 - 11. The system shall continue to provide heat or cooling during change-over of any of the branch selector boxes. Alternately, the contractor must

provide electric strip heat with controls for each of the fan coil units which energizes during this mode.

- B. Unit Cabinet:
1. The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.
- C. Fan:
1. The condensing unit shall consist of one or more propeller type, direct-drive fans that have variable speed operation via a DC (digitally commutating) inverter.
 2. The condensing unit fan shall have 0.32" of external static pressure available.
 3. Nominal sound pressure levels shall be 63 dBA or less.
 4. The fan motor shall have inherent thermal overload protection and permanently lubricated bearings.
- D. Condenser Coil:
1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
 2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
 3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
 4. The fins shall be covered with an anti-corrosion acrylic resin and type E1, hydrophilic film.
 5. The pipe plates shall be treated with powdered polyester resin for corrosion prevention. The thickness of the coating must be between 2.0 to 3.0 microns.
- E. Compressor:
1. The scroll compressors shall be variable speed PAM inverter to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency or STD ON/OFF) shall be controlled to eliminate deviation from target value.
 2. The inverter driven compressor in each condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll "G-type".
 3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
 4. The capacity control range shall be from 100% to as low as 6%.
 5. Each non-inverter compressor shall also be of the hermetically sealed scroll type.
 6. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
 7. Oil separators shall be standard with the equipment together with an intelligent oil management system.
 8. The compressor shall be spring mounted to avoid the transmission of vibration.

9. Units sized 8-12 ton shall contain a minimum of 2 compressors, units larger than 12 tons shall contain a minimum of 4 compressors. In the event of compressor failure the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be designed to specifically address this condition.
 10. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by means of a Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours.
- F. Electrical:
1. The power supply to the outdoor unit shall be as shown on the equipment schedule.
 2. The control voltage between the indoor and outdoor unit shall be 16VDC non-shielded, stranded 2 conductor cable.
 3. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one outdoor unit with one 2-cable wire, thus simplifying the wiring operation.
- 4.2 INDOOR UNITS: CONCEALED CEILING DUCTED
- A. General:
1. Indoor, built-in, ceiling concealed, fan coil units, operable with R-410A refrigerant, shall be equipped with an electronic expansion valve, for installation into the ceiling cavity. The unit shall be constructed of a galvanized steel casing. Computerized PID control shall be used to maintain room temperature within 1°F.
- B. Indoor Unit:
1. The indoor unit shall be completely factory assembled and tested. It shall be provided complete with factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. The unit shall have an adjustable external static pressure switch.
 2. Indoor units shall be above ceiling ducted, wall mount cassette type, ceiling mount cassette type, or below ceiling, horizontal cassette type as scheduled on the plans.
 3. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
 4. Both refrigerant lines shall be insulated from the outdoor unit.
 5. The indoor units shall be equipped with a return air thermistor.
 6. The indoor unit will be separately powered with 208~230V/1-phase/60Hz.
 7. The voltage range will be 253 volts maximum and 187 volts minimum.
 8. Switch box shall be reached from the side or bottom for ease of service and maintenance.
 9. Fan coil units shall be equipped with factory mounted condensate pumps.
- C. Unit Cabinet:
1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
 2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- D. Fan:
1. The fan shall be a direct-drive Sirocco type fan with statically and dynamically balanced impeller and high and low fan speeds available.
 2. The airflow rate shall be available in high and low settings.
 3. The fan motor shall be thermally protected.

4. Ducted fan coils 4 tons and smaller shall be equipped with DC (ECM) motors with auto CFM adjustment at commissioning. This feature shall adjust the airflow based on the external static pressure.
 - E. Coil:
 1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
 2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
 3. A condensate pan shall be located under the coil.
 4. A thermistor shall be located on the liquid and gas line.
 - F. Condensate Pumps:
 1. The units shall be provided with condensate pumps as required. Condensate pumps shall be powered from the associated fan coil unit.
- 4.3 DDC Controls
- A. The Variable Refrigerant Volume system shall be supplied with factory mounted DDC controllers on each fan coil unit and on the condensing units. The controls shall communicate seamlessly to provide precise temperature control and minimize energy consumption.
 - B. An I-touch, touchscreen, Building Automation System shall be provided. This shall communicate directly with the condensing units, fan coils, and other ancillary equipment.
 - C. Advanced Remote Controller

The Advanced Remote Controller shall be capable of controlling a group of up to 16 indoor units. The Advanced Remote Controller shall only be combined in the same group with another Advanced Remote Controller with up to two remote controllers per group.

The Advanced Remote Controller shall connect using two-wire, stranded, non-shielded, non-polar control wire to the indoor unit and shall require no addressing.

The Advanced Remote Controller shall be approximately 4.75" x 4.75" in size with a backlit 2.75" x 1.75" LCD display. Display information shall be selectable from English, French, or Spanish. Day of the week as well as time of day configurable for 12/24 hour clock shall be displayed. Display of temperature information shall be configurable for Fahrenheit or Celsius. The controller shall be able to display room temperature in one degree increments with a range of 0 - 176°F / 0-80°C.

The Advanced Remote Controller shall control the following grouped operations: On/Off, Operation Mode (Cool, Heat, Fan, Dry and Auto), independent Cooling and Heating setpoints in the Occupied mode and independent Cooling Setup and Heating Setback setpoints in the Unoccupied mode, fan speed, and airflow direction and have the ability to individually prohibit controller buttons. The controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating in the occupied period.

The Advanced Remote Controller shall support schedule settings with selectable weekly pattern options of 7-day, Weekday + Weekend, or Weekday + Saturday + Sunday. The schedule shall support unit On/Off with independently settable Cooling and/or Heating setpoints when unit is on (occupied), or Setup and/or Setback setpoints when unit is off (unoccupied). A minimum of 5 operations shall be schedulable per day in 1-minute increments.

The Advanced Remote Controller shall support auto-changeover mode for both heat pump and heat recovery systems allowing the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat according to the room temperature and temperature setpoint. Changeover to cooling

mode shall occur at cooling setpoint + 1°F (0.5°C). Changeover to heating mode shall occur at heating setpoint - 1°F (0.5°C).

The Advanced Remote Controller shall support an Auto Off timer for temporarily enabling indoor unit operation during the unoccupied period. When the Off Timer is enabled and after the unit is manually turned on at the remote controller, the controller shall shut off the unit after a set time period. This period shall be configurable in the controller menu with a range of 30-180 minutes.

The room temperature shall be sensed at either the Advanced Remote Controller or the Indoor Unit return air temperature sensor (or remote mount sensor) dependent on the Field Setting configured through the remote controller.

The Advanced Remote Controller shall display an error code in the event of system abnormality/error. The controller shall also display the following system temperatures to assist service personnel in troubleshooting: Return Air Temperature, Liquid Line Temperature, Gas Line Temperature, Discharge Air Temperature (depending on unit), Remote Controller Sensor Temperature, and Temperature used for Indoor Unit Control.

The Advanced Remote Controller shall support the functions listed below.

Advanced Remote Controller	
Item	Description
LCD Display	Backlit with auto-off after 30 seconds. Contrast adjustment. Capable of two display modes: Standard, which displays Mode, Setpoints, and Fan Speed in large font as well as system status icons, and Detailed which adds Room Temperature (0-176°F/0-80°C range in 1° increment), Airflow Direction, Date and Time.
Menus	The following menus shall be available: Main for basic user operation, Service for installation and commissioning, and Maintenance for troubleshooting.
On/Off	Run and stop operation for an indoor unit or group of indoor units.
Mode	Switches between Cool/Heat/Fan/Dry/Auto.
Occupied Cool/Heat Setpoints	Range: 60-90°F (16-32°C) in 1° increment.
Unoccupied Setup/Setback Setpoints	Range: 40-95°F (5-35°C) in 1° increment.
Fan Speed	Up to 3-speed depending on type of indoor unit.
Air Flow Direction	Air flow direction angles 100%-80%-60%-40%, Swing, depending on indoor unit model.
Weekly Schedule	Patterns: 7-Day, Weekday + Weekend, Weekday + Saturday + Sunday Up to 5 On/Off operations per day with the ability to set new individual Occupied Cooling and/or Heating setpoints or Unoccupied Setup and/or Setback setpoints per operation

PART 5 - HVAC EQUIPMENT ALTERNATE (GENERAL INFORMATION)

- 5.1 Alternate equipment supplier shall provide to the bidding mechanical contractor a complete equipment data package. This package shall include, but is not limited to, equipment capacities at the design condition, power requirements, indoor units CFM/static pressures, fan curves, installation requirements, and physical dimensions. Nominal performance data is not acceptable.
- A. The mechanical contractor shall request and receive the equipment data package 15

- days prior to bid date and submit this package with the alternate bid.
- B. The mechanical contractor shall list the equipment supplier and submit the required data package with the bid detailing a complete comparison of the proposed alternate equipment to the specified equipment and the associated cost reduction of the alternate equipment. The contractor bids an alternate manufacturer with full knowledge that that manufactures product may not be acceptable or approved.
- 5.2 Alternate equipment supplier shall furnish a complete drawing package to the mechanical contractor 15 days prior to bid day. Alternate equipment supplier shall prepare the following drawings:

XXX HVAC Floor Plan
XXX HVAC Refrigerant Piping Plan
XXX HVAC Refrigerant Piping/Controls Details
XXX HVAC Details
XXX HVAC Schedules

- A. The alternate equipment supplier shall draft all piping circuits, components, overall building control schematic, detailed control wiring diagrams, system details and schedules for their system. The drawings shall convey all requirements to successfully install the alternate equipment suppliers system.
- B. Provide (1) drawing package in electronic format (.dxf files) on CD.
- C. The submitted documents shall be complete system designs and show no less information than the HVAC equipment/controls contract bid documents.
- 5.3 The equipment supplier shall submit as part of the equipment data package outdoor unit data sheets. Data sheets to include the following at minimum:

Capacities: Cooling
Cooling (Btu/h)
Cooling Input Power
(kW)
Capacities: Heating
Heating (Btu/h)
Heating Input Power
(kW)
Operating Temperature Range:
Cooling
Heating
Power Supply:
Maximum Circuit Amps (MCA)
Maximum Fuse Amps (MFA)
Maximum Starting Current (MSC)
Total Over Current Amps (TOCA)
Outdoor Fan Motor

Refrigerant:
Refrigerant Type/Charge
Control
Unit Data:
Max. Number of Indoor Units
Sound Pressure Level at 3ft. (dBA)
Weight (lbs)
Dimensions

- 5.4 Alternate equipment supplier shall submit with bid, indoor unit data sheets. Data sheets to include the following at minimum:
- Capacities:

Cooling (Btu/h)
Heating (Btu/h)
Air Flow (CFM)
External Static Pressure (ESP)
Electrical Data (MCA, MFA, FLA)
Weight (lbs)
Dimensions

PART 6 – EXECUTION

6.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install roof-mounting compressor-condenser components on equipment supports specified in Division 7 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- D. Install seismic restraints.
- E. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch. Refer to Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
- F. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

6.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 sections. Drawings indicate general arrangement of piping, fittings and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Ground equipment according to Division 26.
- D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

6.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 4. Remove and replace malfunctioning units and retest as specified above.

6.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.

6.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1 Section "Closeout Procedures."

* End Division 23 *

Division 24 - UNASSIGNED

NOT USED

* End Division 24 *

Division 25 - INTEGRATED AUTOMATION

NOT USED

* End Division 25 *

Division 26 - ELECTRICAL

BASIC ELECTRICAL REQUIREMENTS Section 26 05 00

PART 1 - GENERAL

1.1 WORK INCLUDED

- A Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the Electrical Work as shown on the drawings and as specified hereinafter, including, but not limited to the following:
- 1 New electrical services, including:
 - a Underground primary conduits from the utility point of connection (to be determined) to a new utility transformer vault, and associated grounding (for utility transformers).
 - b Secondary service from the new transformer.
 - c New Fire Station power distribution system to consist of the main switchboard, stand by emergency generator, automatic transfer switch, and branch panelboards. Work to include all feeders, branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
 - 2 Underground Telephone service raceways from the utility point of connection.
 - 3 Underground Cable Television service raceways from the utility point of connection.
 - 4 Lighting branch circuit wiring, wiring devices, switches, and connections to all lighting equipment on the project (interior and exterior).
 - 5 Interior and exterior lighting fixtures completely lamped.
 - 6 Emergency egress/exit illumination system.
 - 7 Cable Television System outlet boxes and conduit as indicated on the drawings.
 - 8 Fire Alarm system.
 - 9 Mechanical equipment power connections, including starters (where required), fuses, disconnect switches, and motor rated switches where noted.
 - 10 Lighting control system (Title 24 compliant).
 - 11 Transient voltage suppression system for all distribution to computer and telecommunications power outlets.
 - 12 Emergency Generator.
 - 13 Automatic transfer switch.
 - 14 Telephone/Data System, outlet boxes and conduit as indicated on the drawings.
 - 15 Fire Station Alerting System provisions as indicate on the drawings. Refer to electrical drawings for scope of electrical work.
 - 16 Radio/Public Address/Intercom speaker system. Refer to electrical drawings for scope of electrical work.
 - 17 Antenna conduit provisions.
 - 18 Photovoltaic System.
 - 19 Electric Vehicle Chargers.
 - 20 Utility Vault electrical systems.
 - 21 Miscellaneous electrical provisions for overhead doors, hose dryers, etc.
 - 22 All required incidental work, such as roof flashing, testing, and temporary power.
 - 23 Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
 - 24 It is the intent of the drawings and specifications that systems be complete and, except as otherwise noted, be ready for operation.

1.2 RELATED WORK

A General Requirements

Fire Station No. 2 (Bayside)

Attachment E - Technicals

Volume 1 of 2 (Rev. May 2015)

- B Finishes
 - C Mechanical
 - D Firestopping
- 1.3 INCORPORATED DOCUMENTS
- A Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.
 - B Published specifications, standard tests or recommended methods of trade, industry or government organizations apply to work of this Section where cited by abbreviations noted below, unless modified herein.
 - 1. 2010 California Code of Regulations, latest adopted edition.
 - 2. 2010 California Building Standards Administrative Code, Part 1, Title 24, C.C.R. latest adopted edition.
 - 3. 2010 California Building Code or latest adopted version (CBC), based on International Building Code 2009 or latest adopted version (IBC) with California Amendments.
 - 4. 2010 California Electrical Code (CEC), Part 3, Title 24, C.C.R. (Based on 2008 National Electrical Code with California Amendments) latest adopted edition.
 - 5. 2010 California Mechanical Code (CMC), Part 4, Title 24, C.C.R. (Based on 2009 Uniform Mechanical Code with California Amendments) latest adopted edition.
 - 6. 2010 California Plumbing Code (CPC), Part 5, Title 24, C.C.R. (Based on 2009 Uniform Plumbing Code with 2007 California Amendments) latest adopted edition.
 - 7. California Energy Code, Part 6, Title 24, C.C.R. latest adopted edition.
 - 8. 2010 California Fire Code (CFC), Part 9, Title 24, C.C.R. (Based on 2009 International Fire Code with California Amendments) latest adopted edition.
 - 9. American Society of Civil Engineers 7-05 (ASCE/SEI), Minimum Design Loads for Buildings and Other Structures.
 - 10. Underwriters' Laboratories, Inc. (UL).
 - 11. Local Utility Company regulations.
 - C All State and Municipal Codes and Ordinances.
- 1.4 CONDITIONS AT SITE:
- A Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.
 - B Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to the Owner to the complete satisfaction of the Owner.
- 1.5 QUALITY ASSURANCE
- A Conformance:
 - 1 All work shall conform to the applicable requirements of Article 1.3 above.
 - 2 The Contractor shall notify the Architect, prior to submission of bid, about any part of the design, which fails to comply with abovementioned requirements.
 - 3 The Contractor shall become familiar with the conditions at the job site, and with the drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
 - 4 The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Architect's approval, before work proceeds in these areas. No additional costs will be considered for work, which must be relocated due to conflicts with the work of other trades.
 - 5 The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.
- 1.6 SUBMITTALS
- A Product Data:
 - 1 Comply with the provisions of Section 01330 – Submittal Procedures.
 - 2 Within 15 days after award of the Contract, submit:

- a Complete material list of all items proposed to be furnished and installed under this Section, including but not limited to the following items: Circuit breakers, lighting fixtures, conduit, devices, enclosures, etc.
 - b Manufacturers' specifications and other data required demonstrating compliance with the specified requirements.
 - c Manufacturers' recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.
 - 3 Shop Drawings: Furnish shop drawings and/or equipment cuts for the following:
 - a Light fixtures including lamps and ballasts
 - b Main Switchboard, and panel boards. Panel board submittals shall include diagrams of the circuit breaker arrangements in the panels. Arrange circuit breakers in panels exactly as shown on the panel schedules in the construction documents.
 - c Fire alarm system
 - d Emergency Generator
 - e Disconnect switches
 - f Motor starters
 - g Automatic Transfer Switch
 - h Lighting control system
 - i Transient voltage suppression system
 - j Power and signal concealed service floor boxes
 - k Other equipment where noted in other Sections.
 - l Mechanical and Plumbing equipment. The Electrical Contractor shall review the Mechanical and Plumbing Submittals, and verify the voltage, wire size and overcurrent protection required. Also provide the Electrical Engineer with a copy of the submittals for their review.
 - 4 Test Reports:
 - a Factory Tests: As specified for specific equipment.
 - b Field Tests: Performance tests as specified for specific equipment.
 - c Megger Tests: As specified under TESTING.
 - d Special Seismic Certification documentation as per CBC and ASCE/SEI requirements for all equipment defined as 'critical' with an importance factor of 1.5, as per Paragraph 1.10 of this Section.
 - 5 Maintenance and Operating Manuals:
 - a Systems Description: Description of operating procedures.
 - b Controls: Diagrams and description of operation of each system.
 - c Equipment: Manufacturer's brochures, ratings, certified shop drawings, maintenance data, and parts lists with part numbers. Mark each sheet with equipment identification number and actual installed condition.
 - d Materials and Accessories: Manufacturer's brochures, parts list with part numbers, and maintenance data where applicable. Mark each sheet with identification number of system and location of installation.
 - e The Maintenance and Operation Manual shall be presented in a three ring binder that has tabbed sections.
 - 6 Record Documents:
 - a "As-builts": As specified under Paragraph 3.2 of this Section.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all trades.
 - B Delivery and Storage: Deliver all materials to the job site in their original containers with all labels intact and legible at time of use. Store in strict accordance with approved manufacturers' recommendations.
 - C Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

- D This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

1.8 SCHEDULING/SEQUENCING

- A Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet the construction schedule, together with any special handling charges, shall be borne by this Contractor.
- B The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied equipment is delivered to site in coordination with the construction schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

1.9 REQUIREMENTS

- A The contract drawings indicate the extent and general arrangements of the conduit wiring systems, etc. If any departures from the contract drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable, and within thirty-five (35) days after award of the electrical contract.
- B Unless material list and data is received as a complete and all inclusive submittal within the stipulated time all items shall be provided as specified -- with no deviations permitted.
- C Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether architectural, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.
- D Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.
- E Where required by Architect to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

1.10 SEISMIC CERTIFICATION OF EQUIPMENT AND INSTALLATION

- A. See Architectural and Structural Drawings and Specifications for description of Occupancy Group and Seismic Design Category applicable to this project.
- B. Provide Special Seismic Certification per CBC Section 1708 and ASCE/SEI 7-05 for all critical equipment and components. See Paragraph 1.10.M.3 of this Section for list of equipment designated as critical equipment with an importance factor of 1.5.
- C. Critical equipment shall be considered a component of the structure and shall "remain online and functional" for continuous operation of the facility after a seismic event.
- D. Comply with component seismic design and anchorage requirements of CBC Section 1613 for all other equipment.
- E. Provide seismic restraints per applicable code and as specified or indicated. Design restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift.
- F. Rigidly Supported Equipment, Conduits, and Raceways.
- G. Lighting:
 - 1. Fasten lighting fixtures in suspended ceilings to ceiling grid system or otherwise support from the structures as specified herein and as per details indicated on the Drawings. Comply with National Electric Code (NEC) Article 410-16.
 - 2. Suspension systems for light fixtures shall allow fixtures to swing a minimum of 45 degrees from the vertical in all directions without contacting obstructions.
 - 3. Free-swinging suspension systems shall have a safety wire or cable attached to the fixture and structure at each support. The wire shall be capable of supporting four times the weight of the lights.
 - 4. Point-source fixtures: provide slack wires to structure at two diagonal corners.
 - 5. Troffer fixtures: provide hold-down clip at each fixture corner, and slack wires to structure at two diagonal corners.
 - 6. Supports for pendants: Provide diagonal seismic wire restraints per Code.
- H. Components supported by chains or simply suspended from above are not required to meet lateral seismic force requirements and seismic relative displacement requirements provided

that they cannot be damaged or cannot damage any other component when subject to seismic motion. They must have ductile or articulating connections to the structure at the point of attachment.

- I. Electrical Cabinets:
 - 1. Electrical cabinet design shall conform to National Electrical Manufacturers Association (NEMA) 250 and NEMA ICS6 standards. Cutouts in the lower shear panel that do not appear to have been made by the manufacturer and significantly reduce the strength of the cabinet are not permitted unless analysis demonstrates that the remaining strength is sufficient.
 - 2. Single freestanding cabinets shall have a minimum of four anchor bolts designed and specified with one anchor located at each corner.
 - 3. Multiple sections of cabinets or enclosures located adjacent to each other shall be bolted together. Minimum acceptable bolting is three bolts in the front and back along the adjacent vertical faces – 6 bolts total.
 - 4. Multiple cabinets bolted together to form a section or line-up shall have at a minimum two anchors specified for each cabinet, one at the front and one at the rear.
 - 5. Base anchorage shall be installed through anchor points designated by the Manufacturer. The largest bolt diameter for the anchor hole provided in the equipment shall be provided.
 - 6. A latch or fastener to prevent opening during an earthquake event and damaging the cabinet and internal components shall secure all doors.
 - 7. Slide-out components in electrical control panels, etc., shall have a latching mechanism to hold contents in place.
 - 8. Attached cabling shall have adequate slack or flexibility between the cabinets and surrounding structure supporting the conduit to preclude severing of the cabling due to differential seismic displacements.
- J. The design load shall include the effects of loading on the equipment imposed by attached utility or service lines that are also attached to separate structures.
- K. The attachment of additional external items is not permitted unless such items have either been provided by the Manufacturer, or analysis shows that their effects are supported by design.
- L. Conduit and their connections shall be constructed of ductile materials unless otherwise approved by the Architect. Conduits and their connections constructed of non-ductile materials (e.g., cast iron, no-hub pipe and plastic) shall have brace lengths reduced to one-half that allowed for ductile material.
 - 1. All trapeze assemblies supporting conduit shall be braced to resist CBC design forces considering the total weight of the elements on the trapeze.
 - 2. Seismic restraint spacing shall be in accordance with hanger spacing.
- M. Critical Equipment:
 - 1. Design with importance factor of 1.5.
 - 2. Provide Special Seismic Certification for all equipment and components and their installation per CBC and ASCE/SEI requirements.
 - 3. Critical Equipment shall include the following:
 - a. All emergency distribution panels and panelboards on emergency power.
 - b. Fire Alarm related enclosures.
 - c. Emergency Generator.
 - d. Automatic Transfer Switch.
 - e. Lighting Control panels and cabinets.
 - f. Telecom Racks and Cabinets.
- N. Seismic Design Submittals: For all Critical Equipment included in paragraph 26 05 00.1.10.M.3.
 - 1. The Manufacturer of each item of critical equipment shall arrange for the testing or analysis by an approved agency of each component and assembly and its mounting system or anchorage.
 - 2. The Manufacturer shall submit a Certificate of Compliance for each item for approval by the Architect and by the Authority Having Jurisdiction.

3. Based on Manufacturer's approved submittal, Contractor shall retain the services of a State of California registered Structural Engineer to prepare final installation details and drawings for equipment supports and attachments stamped by.
4. Submit drawings of the equipment showing dimensions, support equipment, connections, and the proper anchorage locations.
 - a. Equipment weight and weight distribution (e.g., center of gravity in elevation and plan).
 - b. Thickness of sheet metal bases.
 - c. Seismic Vibration Isolation Devices: Manufacturer's product information indicating class and type. Indicate load ratings as published manufacturer's data or shop drawings. Indicate proper orientation of devices on plan.
 - d. Inertia bases and support frames.
 - e. Specific details of restraints including anchor bolts and welds and maximum load at each location.

1.11 GUARANTEE

- A This Contractor shall guarantee that all work executed under this Section will be free from defects of materials and workmanship for a period of one (1) year or as per the General Conditions of this project, whichever is longer. Dates shall be from the date of final acceptance of the building. The contractor shall further guarantee that he will, at his own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the guarantee. Such repair or replacement shall be guaranteed for one (1) year from the date of repair or replacement.

1.12 PERMITS AND INSPECTIONS

- A This Contractor shall obtain and pay for all required permits and arrange for all inspections required.
- B Do not allow or cause any of the work to be covered or enclosed until it has been tested and/or inspected.

1.13 IDENTIFICATION

- A Switchboards, feeder circuit breakers in switchboards, panels, disconnect switches, motor starters and motor disconnect switches, cabinets, and other apparatus used for the operation of, or control of circuits, appliances or equipment, shall be properly identified by means of engraved laminated plastic descriptive nameplates mounted on apparatus using stainless steel screws. Nameplates shall have white letters with black background and be submitted to the Architect for approval. Cardholders in any form are not acceptable.
- B Each branch circuit of panel boards to have a permanently fixed number with load directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of equipment supplied by breakers.
- C Provide label on all motors: "Caution. Automatic equipment. May start at any time."
- D Provide silk-screened or engraved identification labels on all switch box covers identifying specific loads that are not readily apparent to the user, including electroshades, projection screens, exhaust fans, etc.. Submit proposed labels to Architect for approval prior to manufacture of labels.
- E Provide identification of all pull boxes, junction boxes, and conduit stub-ups on the project as outlined below:
 - 1 For Power Feeders:
 - a Stencil cover with identifying circuit number.
 - b Lettering 1" high.
 - c Color of lettering black.
 - d Place lettering on cover in neat manner; run parallel to long sides of box.
 - 2 For branch circuits, grounding, communication, signal, and control systems boxes and blank conduit stub-outs:
 - a Paint inside back of each j-box, front of each cover, and ends of each blank conduit stub-out with identifying system color as listed below:

<u>System</u>	<u>Color</u>
120/208 volt	Blue

Telephone/Data	Grey
Ground system	Green
Fire Alarm	Red
Radio/PA/Intercom/Alerting System	Yellow
Security	White
Lighting control	Orange/White

PART 2 - PRODUCTS

2.1 GENERAL

A Refer to applicable Division 26 and 28 Sections for complete products specifications.

2.2 MATERIALS

A Materials of the same type or classification, used for the same purpose, shall be the product of the same manufacturer.

2.3 ACCEPTABLE MANUFACTURERS

A Materials shall be of make mentioned elsewhere in this specification. All materials shall be the best of their several kinds, perfectly new and approved by the Underwriters' Laboratories.

B Where material, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of desired quality, style and utility and shall be the basis of the bid. Materials so specified shall be furnished under the contract unless changed by written approval of the Architect. Where two or more designations are listed, choice shall be optional with this Contractor, but this Contractor must submit his choice for final approval.

2.4 POSTED OPERATING INSTRUCTIONS

A Furnish approved operating instructions for systems and equipment where indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instruction exposed to the weather. Operating instruction shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

2.5 CATALOGED PRODUCTS/SERVICE AVAILABILITY

A Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonable convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 3 - EXECUTION

3.1 INSPECTION

A Examine the areas and conditions under which the work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A Drawings:

- 1 The general arrangement and location of wiring and equipment is shown on the electrical drawings and shall be installed in accordance therewith, except for minor changes required by conflict with the work of other trades.
 - 2 The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.
 - 3 Drawings indicate the circuit and panel, which supplies each device or fixture. Provide and install conduit and conductors to make all connections from panel to nearest device and from first device to additional devices on same circuit. Conduit size and fill shall satisfy NEC requirements. Each branch circuit to have a dedicated neutral conductor. Do not exceed 4 #12 or 3 #10 conductors in a 1/2" conduit, 7 #12 or 5 #10 in a 3/4" conduit, and 11 #12 or 9 #10 in a 1" conduit, unless otherwise noted. If more than three current carrying conductors are installed in one conduit, conductor size shall be increased as required per Note 8 to Table 310-16 of the NEC.
 - 4 Drawings indicate the location of all light switches. Where fixtures in a room are controlled by more than one switch, the same lower case letter is drawn adjacent to a switch and each fixture controlled by that switch. Where no lower case letter is adjacent to a switch, all fixtures in the room are controlled by that switch. Provide and install conduit and wire from fixture to switch and between fixtures as required to accomplish switching shown. Do not route branch circuit wiring for light fixtures through switch boxes.
 - 5 Drawings indicate location of all signal outlet boxes. Provide and install conduit system as required for complete connections of system wiring, unless otherwise noted.
 - 6 Control wiring is generally not shown on the plans. Contractor shall refer to control diagrams and provide and install all wiring and raceways required to make all interconnections.
 - 7 All branch circuit wiring No. 12 or No. 10 as noted, all control wiring No. 14, except as noted next to "slash marks" on drawings, or as noted under "Wire," as specified herein.
 - 8 All dimensions, together with locations of doors, partitions, etc. are to be taken from the Architectural Drawings, verified at site by this Contractor.
 - 9 Maintain "as-built" records at all times, showing the exact location of concealed conduits and feeders installed under this contract, and actual numbering of each circuit. Upon completion of work and before acceptance can be considered, this Contractor must forward to Architect vellums (obtained from the Architect at cost) corrected to show the electrical work as installed.
 - 10 Branch circuit conductors shall be #12 minimum and #10 minimum for runs longer than 150 feet.
- B Measurements: Before ordering any material or closing in any work, verify all measurements on the job. Any differences found between dimensions on the drawings and actual measurements shall be brought to the Architect's attention for consideration before proceeding.
- 3.3 FIELD QUALITY CONTROL
- A All workmanship shall be first class and carried out in a manner satisfactory to and approved by the Architect.
 - B This Contractor shall personally, or through an authorized and competent representative, constantly supervise the work and so far as possible keep the same foreman and workmen on the job throughout.
- 3.4 COORDINATION
- A In electrical rooms, where electrical equipment is located at walls with brace framing, provide and install steel channel supports for mounting of electrical equipment away from wall to avoid conflict with brace framing. Steel channel supports shall be unistrut or equal, and shall include all channels, bases, fittings, etc., as required for a complete installation.
 - B In electrical rooms, Contractor is responsible for installation of electrical equipment within the space provided. Contractor shall provide 1/4" scale plans of electrical room layouts, and elevations of steel channel supports (where used or required) of electrical equipment for review and approval prior to any installation or rough-in.
- 3.5 INSTALLATION/APPLICATION/ERECTION

- A All cutting, repairing and structural reinforcing for the installation of this work shall be done by the General Contractor in conformance with the Architect's requirements.
- 3.6 TEMPORARY LIGHTING AND POWER
 - A Provide and install temporary lighting and power systems for the duration of construction, of adequate size to accommodate the required lighting and power loads. Coordinate with other trades to insure adequate sizing.
 - B Provide distribution equipment as required to support all construction activities.
 - C Pay all utility company charges (installation and energy) related to temporary power usage during construction.
- 3.7 FIRE STOPPING AND FIRE RATED PENETRATIONS
 - A All electrical equipment mounted in, on, or through fire rated construction shall be installed to maintain the fire rating of the construction.
 - B Provide fire rated pads (or other suitable assembly) around all electrical junction boxes in fire rated walls/ceilings/floors to maintain the fire rating.
 - C Provide fire rated construction around all recessed light fixtures and/or panel board / cabinets mounted flush in fire rated walls to maintain the fire rating. Coordinate depth of construction with other trades to avoid conflicts.
 - D Conduit sleeves shall be provided as a means of routing cables through fire-rated walls or floors. Openings in sleeves and conduits used for system cables and those which remain (empty) spare shall be sealed with an approved fireproof, removable sagging material. Sleeves which pass vertically from floor to floor shall be sealed in a similar manner using an approved re-enterable system. Additional penetrations through rated assemblies necessary for passage of tel/data wiring shall be made using an approved method and permanently sealed after installation of cables.
- 3.8 ADJUSTING AND CLEANING
 - A All equipment, lighting fixtures, etc., shall be left in clean condition, with all shipping and otherwise unnecessary labels removed there from.
- 3.9 SCHEDULES
 - A Coordination: Coordinate installation of electrical items with the schedule for other work to prevent unnecessary delays in the total Work.
- 3.10 WARNING SIGN MOUNTING
 - A Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.
- 3.11 PAINTING OF EQUIPMENT
 - A Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.
 - B Field Applied: Paint electrical equipment as required to match finish or meet safety criteria. Painting shall be as specified in the respective equipment section.
- 3.12 TESTS
 - A Testing and inspection: See Section 26 08 00 - Testing.

* * *

COMMISSIONING OF ELECTRICAL EQUIPMENT

Section 26 08 00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Electrical commissioning description.
 - 2. Electrical commissioning responsibilities.
- B. Related Sections:
 - 1. Section 01 91 00 – Building Commissioning.
 - 2. Section 22 08 00 – Commissioning of Plumbing Equipment: Plumbing systems commissioning requirements.
 - 3. Section 23 08 00 – Commissioning of HVAC: HVAC systems commissioning requirements.

1.2 COMMISSIONING DESCRIPTION

- A. Electrical commissioning process includes the following tasks:
 - 1. Testing and startup of Electrical equipment and systems.
 - 2. Equipment and system verification checks.
 - 3. Assistance in functional performance testing to verify testing, and equipment and system performance.
 - 4. Provide qualified personnel to assist in commissioning tests.
 - 5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.
 - 6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
 - 7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.
 - 8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.
 - 9. Provide training for systems specified in this Section with coordination by Commissioning Authority.
- B. Equipment and Systems to Be Commissioned:
 - 1. Interior lighting fixtures and controls.
 - 2. Exterior lighting fixtures and controls.
 - 3. Normal & emergency electrical power distribution

1.3 COMMISSIONING SUBMITTALS

- A. Section 01 91 00 – Building Commissioning: Requirements for commissioning submittals.
- B. Draft Forms: Draft forms of the system verification forms and the functional performance test checklist will be produced and issued as part of the Commissioning Plan by the Commissioning Authority.
- C. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use forms provided by the Commissioning Authority as guidelines.
- D. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance. Deficiencies should be reported to the General Contractor, Owner, Architect/Engineer, and Commissioning Authority.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures: Requirements for submittals.
- B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.
- C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

1.5 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:

1. Attend commissioning meetings.
2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.
3. Ensure testing and adjusting as specified.
4. Provide instructions and demonstrations for Owner's personnel.
5. Ensure subcontractors perform assigned commissioning responsibilities.
6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
7. Develop startup and initial checkout plan using manufacturer's startup procedures and functional performance checklists for equipment and systems to be commissioned.
8. During verification check and startup process, execute portions of checklists for equipment and systems to be commissioned.
9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
10. Provide manufacturer's representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.
13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.
14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.
15. Provide factory supervised startup services for equipment and systems. Coordinate work with manufacturer and Commissioning Authority.
16. Perform verification checks and startup on equipment and systems as specified.
17. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.
18. Perform operation and maintenance training sessions scheduled by Commissioning Authority.
19. Conduct system orientation and inspection.

1.6 COMMISSIONING MEETINGS

- A. Section 01 91 00 – Building Commissioning: Requirements for commissioning meetings.
- B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.7 SCHEDULING

- A. Section 01 32 14 - Progress Schedule: Requirements for scheduling.
- B. Contractor to prepare schedule indicating anticipated start dates for the following:
 1. Lighting testing.
 2. Equipment and system startups.
 3. Control system checkout.
 4. Testing and adjusting.
 5. Electrical system orientation and inspections.
 6. Operation and maintenance manual submittals.
 7. Training sessions.
- C. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy and use.

1.8 COORDINATION

- A. Section 01 31 00 – Project Management and Coordination: Requirements for coordination.
- B. Notify Commissioning Authority minimum of 3 weeks in advance of the following:
 - 1. Scheduled equipment and system startups.
 - 2. Scheduled control system checkout.
 - 3. Scheduled start of testing and adjusting work.
- C. Coordinate programming of control system with construction and commissioning schedules.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Place Electrical systems and equipment into full operation and continue operation during each working day of commissioning.

3.2 COMMISSIONING

- A. Functional Performance Tests:
 - 1. Test equipment with fully occupied building.
 - 2. Participate in testing delayed beyond Final Completion to test performance at peak seasonal conditions.
- B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.
- C. Warranty Period Re-Commissioning:
 - 1. Return to site minimum (8) eight months after Substantial Completion and before the expiration of correction / warranty period.
 - a. Review current equipment and system operation and condition of outstanding issues related to original and seasonal commissioning with Owner's personnel.
 - b. Interview Owner's personnel to identify problems or concerns regarding equipment and system operation.
 - c. Make suggestions for improvements and for recording changes in operation and maintenance manuals.
 - d. Identify deficiencies covered by warranty or original construction contract.
 - e. Assist Owner's personnel to develop reports, documents and requests for services to remedy outstanding problems.

* * *

TESTING

Section 26 08 00

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work Included in This Section: All materials, labor, equipment, services and incidentals necessary to perform the testing of the electrical work, including but not limited to the following:
 - 1. Grounding System.
 - 2. Lighting System.
 - 3. Distribution System.
 - 4. Fire Alarm System.
 - 5. Lighting control system.
 - 6. Automatic Transfer Switch.
 - 7. Engine Generator.
 - 8. Title 24 Acceptance Testing
 - 9. Photovoltaic system.
- B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
- C. All work shall comply with Sections 26 05 00 – Basic Electrical Requirements.
- D. The Contractor shall engage the services of a recognized corporately and financially independent testing firm, Emerson, or equal, for the purpose of performing the following inspections and tests:
 - 1. System Grounding
 - 2. Main Switchgear
 - 3. Feeders
- E. The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections. The purpose of these tests is to assure that all tested electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

1.2 APPLICABLE CODES, STANDARDS, AND REFERENCES

- A. All inspections and tests shall be in accordance with the International Electrical Testing Association - Acceptance Testing Specifications ATS-2003 (referred to herein as NETA ATS).

1.3 QUALIFICATIONS

- A. Qualifications of Testing Firm shall be as listed in Section 3 of NETA ATS.

PART 2 - PRODUCTS

- 2.1 This article does not apply to testing.

PART 3 - EXECUTION

3.1 GENERAL

- A. Final test and inspection to be conducted in presence of Architect and Owner: Test shall be conducted at the expense of and by the Contractor at a mutually agreed time. Submit written test report.
- B. The electrical installation shall be inspected and tested to ensure safety to building occupants, operating personnel, conformity to code authorities and Contract Documents.

3.2 INSPECTIONS AND TESTS

- A. Tests: Field tests shall be performed and reports submitted.
 - 1. Final Inspection Certificates: Prior to final payment approval, deliver to the Owner, with a copy to the Architect, signed certificates of final inspection by the appropriate local authority having jurisdiction.
- B. Grounding System:
 - 1. All ground connections shall be checked and the entire system shall be checked for continuity. The resistance of the ground system shall be measured using a 3 point fall-of-potential method. The maximum ground resistance shall be three ohms. If the

- measured ground resistance exceeds three ohms, additional ground rods shall be installed until a value of three ohms or less is obtained.
2. Ground tests shall meet the requirements of the National Electric Code.
- C. Lighting Systems:
1. The interior and exterior lighting systems shall be checked for proper local controls and operation of entire installation, including the operation of the low voltage lighting control system.
- D. Power Distribution System:
1. Tests: Test main switchboard, bus duct, distribution boards, and panelboards for grounds and shorts with mains disconnected from feeders, branch circuits connected and circuit breakers closed, all fixtures in place and permanently connected and grounding jumper to neutral lifted and with all wall switches closed.
 2. Test each individual circuit at each panelboard with equipment connected for proper operation. Inspect the interior of each panel.
 3. Check verification of color coding, tagging, numbering, and splice make-up.
 4. Verify that all conductors associated with each circuit are in same conduit.
 5. Demonstrate that all lights, jacks, switches, outlets, and equipment operate satisfactorily and as called for.
 6. Perform megger tests of all distribution system feeders prior to energizing. All Cables failing megger tests or with evidence of damage shall be removed and replaced in their entirety (no splices), at no cost to the Owner. Damaged cables may not be field repaired without specific approval of the engineer.
- E. Fire Alarm System: Verify that all equipment, components, and devices function as specified. Refer to Section 28 31 00-3.03 for additional testing requirements
- F. Lighting Control System: Verify that all equipment, components, and devices function as specified.
- H. Automatic Transfer Switch: Verify that all equipment, components, and devices function as specified. See Section 26 36 23 – Automatic Transfer Switch for full requirements for equipment testing - assist manufacturer in performance of all start-up and testing for Owner-supplied equipment.
- I. Generator: Verify that all equipment, components, and devices function as specified. See Section 26 32 13 – Standby Emergency Electric Generator for full requirements for system start-up, testing, and training of Owner personnel - assist manufacturer in performance of all start-up and testing.
- J. Photovoltaic System: See 25 31 01 – Photovoltaic System for testing requirements.
- K. Title 24 Acceptance Testing: Contractor shall complete the requirements for Title 24 Acceptance Testing, as per CA Title 24, Part 6.
1. Perform testing requirements as per Title 24 Lighting Acceptance requirements. Testing shall include construction inspection of installed controls, occupancy sensor testing, manual daylighting controls testing, and automatic time switch controls testing.
 2. Complete and submit required LTG forms for Lighting Control Acceptance and Automatic Daylighting Controls Acceptance.
 3. Obtain required review and approval of Acceptance Forms to allow final certificate of occupancy to be granted.

* * *

SERVICE AND DISTRIBUTION SYSTEM **Section 26 24 00**

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Work Included in This Section: All materials, labor, equipment, services and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below.
- B. Underground service distribution conduits and cable where noted for power, cable TV, and telephone services.
- C. Temporary power for construction.
- D. Utility Power Vault with all required San Diego Gas and Electric work as indicated on the drawings.
- E. Main switchboard, bus duct, distribution panel, distribution system, panelboards, grounding, overcurrent protective devices.
- F. All required incidental work, such as excavating, backfilling and testing.
- G. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
- H. All work shall comply with Sections 26 05 00 – Basic Electrical Requirements and 26 27 00 – Basic Electrical Materials and Methods.
- I. Provide CBC compliant seismic installation. Provide Special Seismic Certification documentation as per CBC and ASCE/SEI requirements for all equipment defined as 'critical' with an importance factor of 1.5, as per Paragraph 1.10 of Section 26 05 00 – Basic Electrical Requirements (including all equipment on emergency power in this Section).

1.2 RELATED WORK

- A. Finishes
- B. Mechanical

1.3 SUBMITTALS

- A. Comply with the provisions of Section 26 05 00 - Submittals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Refer to Section 26 05 00 – Basic Electrical Requirements, Part 2 - Products
- B. List of Equipment Manufacturers:
 - Main Switchboard
Westinghouse/Cutler Hammer
General Electric
Industrial Electric Manufacturing
Siemens
 - Panelboards and Distribution Panel
Same manufacturer as main switchboard

2.2 MATERIALS

- A. Provide and install secondary service to main switchboard. Comply with all Utility Co. requirements.
- B. Furnish and install telephone and cable television service conduits and pullboxes; install conduits to main backboard as shown. All work shall conform to utility company requirements and to Section 26 27 00 - Basic Electrical Materials and Methods.
- C. Grounding:
 - 1. Provide and install grounding system as noted on the Drawings.
 - 2. Grounding electrode conductor: bare stranded copper type, #4/0 minimum.
 - 3. Install ground wires in rigid conduit.
 - 4. All grounding electrode conductor connections "thermite" or "cad-weld" welded.
 - 5. Use approved pressure type solderless connector or use fusion welding for all connections to and bonding of grounding electrode system. All connections shall be visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
 - 6. Furnish and install solid copper 3/4" x 10'-0" ground rod(s). Where multiple ground rods are shown, install a minimum of 20'-0" apart. Install ground rods in accessible boxes

- with covers. Furnish and install 2-#4/0 bare copper cables between multiple ground rods and main switchboard ground bus.
7. Terminate grounding conduits at equipment with ground bushing, with ground wire connected through bushing.
 8. Provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
 9. Ground all isolated sections of metallic raceways.
 10. Provide #12 minimum stranded (green) THHN conductor sized per NEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures.
 11. Grounding electrode installed as follows:
 - a. Place #4/0 bare copper cable in foundation trench; tensioned, supported in such a manner that it cannot be less than two (2) inches from bottom or side of concrete when foundation concrete is poured; not less than one hundred feet of conductor. Embed in foundation with a loop at approximate center, brought out at top of foundation adjacent to building service equipment for connection to service equipment and for bonding to other parts of the grounding system.
 - b. Use approved pressure type solderless connector or use fusion welding for all connections to grounding electrode. Connection visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
 - c. Connect grounding electrode system to metallic water service entry metallic cold water pipe (if available) with nonferrous clamp and bare copper cable (sized as required) in conduit. Connection shall be accessible for inspection.
 - d. Connect grounding electrode system to building steel as noted on Drawings. Use exothermic weld, connection shall be accessible for inspection.
 - e. After installation, test system using the three-point fall of potential method only. Record results and submit to Architect for approval. If resistance to ground exceeds three (3) ohms, install additional ground rods, bonded and interconnected to grounding electrode system. Provide additional grounding until resistance is less than three (3) ohms.
- D. Main Switchboard:
1. General: Switchboard shall be distribution panel type, metal enclosure with ground bus and insulated full capacity neutral bus.
 2. Equipment:
 - a. The switchboard shall be braced for a short circuit current of as indicated on the drawings. Bracing shall be per NEMA and UL standards.
 - b. The switchboard shall comply with all the requirements of the Utility Company.
 3. The switchboard shall be floor-mounted, self-supporting, dead-front and rear, front-operated, front-connected, distribution type. The enclosure shall be 90 inches high made of cold rolled steel on a structural shape, or formed, steel frame and shall be mounted on two 3-inch, 5-pound continuous channel iron sills, which shall be closed at the ends between the two channels.
 4. This contractor is responsible for the complete installation of the new switchboard within the space provided (both vertical and horizontal) and shall verify and/or coordinate all dimensions prior to ordering equipment. Proper allowances should be included to allow complete installation and erection.
 5. The switchboard shall be a minimum of 20 inches deep and shall be constructed of National Electrical Code (NEC) gauge steel.
 6. The switchboard shall be provided with a cable pull section at the top of the switchboard. Provide a minimum 12 inches of vertical clearance between the cable terminal lugs bolted to the switchboard busses and the top and bottom of the switchboard enclosure. Horizontal pull sections and gutters shall be kept free and clear of busses. Where busses cross vertical pull sections, the busses shall be insulated.
 7. All connections between bus bars shall be of a bolted type using Belleville washers. Clamps will not be accepted. All bus bars shall be accurately formed, and all holes shall be made in a manner, which will permit bus bars and connections to be fitted into place without being forced.

8. The design of all current-carrying devices or parts of the switchboard shall conform to the standard specified in the related sections of Underwriters' Laboratories, Inc. (UL) No. UL-891 and National Electric Manufacturer's Association (NEMA) Standard PB-2, except as these characteristics may be modified herein.
 9. Bus bars, connection bars and wiring on the back of the switchboard shall be arranged so that maximum accessibility is provided for cable connections from the front.
 10. Ampere ratings for rectangular bus bars shall be in accordance with the temperature rise standard of National Electric Manufacturer's Association (NEMA) and the Underwriters' Laboratories, Inc. (UL).
 11. The enclosure shall be chemically cleaned by Parkerizing, bonderizing or phosporizing as a unit after all welding has been completed. The enclosure shall then be painted with a rust-resisting primer coat of paint and shall be finished with a coat of light gray, baked enamel.
 12. Each section shall be bussed for the full-connected load of that section. Extend bussing to spare circuit breaker "Spaces." Drill busses for future circuit breakers, and provide breaker connector hardware as required.
 13. Provide copper bus bars and connections with silver-plated contact surfaces.
 14. The contact surfaces and studs of all devices to which bus connections are made shall also have silver-plated surfaces.
 15. Locate ground bus, with a cross-section equal to at least 25 percent of the capacity of the main bus rating, in the back of the switchboard and extend bus throughout the length of the switchboard assembly. Ground each housing of the assembly directly to this bus.
 16. Rigidly support all bus and connection bars and current transformers.
 17. Fit all nuts and connections with locking devices to prevent loosening.
 18. Provide load connections with solderless lugs. Factory-install all devices shown on Drawings as specified herein.
 19. Provide half-inch copper braid pigtail at side of switchboard enclosure for termination of signal system ground cables. Pigtail to be located on side of distribution section.
 20. Provide a bonding strap from the equipment ground bus to the neutral bus.
 21. Provide transient voltage surge protection, integral to or adjacent to the main switchboard when indicated on the plans or where otherwise noted on the plans. Refer to Section 26 43 00 – Transient Voltage Surge Suppressor.
- E. Panelboards:
1. Surface or flush mounted, with branch circuits as shown on drawings.
 2. Enclosures: code gauge galvanized sheet steel with welded full flange end pieces; stretcher- leveled steel trim, backpan and door.
 3. Bussing of copper with silver-plated contact surfaces.
 4. Provide a 200% rated neutral bus for panels supplied with 200% rated feeders (incoming or outgoing). Refer to single line riser diagram for feeder ratings.
 5. Trims on surface-mounted cabinets secured with nickel-plated screws with cup washers, bottom of all trims to have lugs for resting on cabinet flange.
 6. Panels shall be 20 inches minimum in width, provided with approved gutter space, barriers and adjustable supports. Doors mounted with concealed hinges provided with combination spring latch and lock. Doors and trims and surface mounted cabinets primed and finished with one coat baked on gray enamel. All visible panel enclosures and covers in finished (occupied) areas shall be painted to match adjacent wall finish.
 7. Breakers on same phase to be aligned horizontally. Each panel provided with 5-handle locks.
 8. Each branch circuit of panelboards to have a permanently fixed number with one word directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of outlets controlled by breakers. Color code mains and each breaker terminal, same as conductor insulation.
 9. Each panel shall be equipped with a copper ground bus.
 10. All panels shall be fully bussed to accept future circuit breakers.
 11. Panel board submittals shall include diagrams of the circuit breaker arrangements in the panels. Arrange circuit breakers in panels exactly as shown on the panel schedules in the construction documents.

- F. Circuit Breakers:
1. General: Circuit breakers shall be molded case rated for 240 volts, multiple or single pole and amperage rating as shown on the drawings, bolt on, manually operated with "de-ion" arc chutes.
 2. Main circuit breaker shall be shall be rated to interrupt the available short circuit current as indicated on the drawings.
 3. Distribution circuit breakers shall be rated for the amps interrupting capacity noted on the drawings.
 4. Branch circuit breakers shall be rated for the amps interrupting capacity or U.L. series rated with the distribution and main circuit breakers, General Electric type THQB or equal, minimum 10,000 A.I.C for 120/208 volt; type TEY or equal.
 5. Branch breakers feeding dwelling unit Bedroom 20 Amp branch circuits shall be arc-fault circuit-interrupting type (per NEC 210-12).
 6. Where mechanical equipment is U.L. listed for overcurrent protection with fuses or HACR type circuit breakers, provide fuses where a fused switch is shown. Where the overcurrent protection is a circuit breaker provide HACR, (HACR means Heating, Air-Conditioning and Refrigeration) type.
 7. Provide switch rated type "SWD" circuit breakers were the circuit breaker is going to be used as a switching device in a panelboard.
- G. Magnetic starters: shall be rated in accordance with latest published NEMA standards for size and horsepower rating, Westinghouse A-200 series or equal. Provide with overload sensor in each phase, hand-off-auto switch, red "run" pilotlight, in NEMA 1, NEMA 4X, or NEMA 3R enclosure or in motor control center where indicated. Coil shall be rated 120 VAC. Starters shall be across-the-line non-reversing unless otherwise noted.
1. Contacts: Across-the-line magnetic starters shall be equipped with double break silver alloy contacts. All contacts shall be replaceable without removing power wiring or removing starter from panel. The starter must have straight-through wiring.
 2. Coils: Coils shall be of molded construction. All coils shall be replaceable from the front without removing the starter from the panel.
 3. Overload Relays and Thermal Units: Overload relays shall be the melting alloy type with a replaceable control circuit module. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if the thermal unit is removed.
- 2.3 SHORT-CIRCUIT ANALYSIS AND COORDINATION STUDY
- A. Scope of Services:
1. Provide a current and complete short-circuit study, equipment interrupting or withstand evaluation, and a protective device coordination study for the electrical distribution system, including the 120/208V system and all feeder breakers 100A rating or higher.
 2. The System Coordination and Short-Circuit Analysis Study shall be performed by Emerson, or equal.
- B. Submittals:
1. The studies shall be submitted to the Architect prior to granting final approval of the distribution equipment shop Drawings and/or prior to release of equipment for manufacture.
- C. Short-Circuit Study:
1. The study shall be in accordance with applicable ANSI and IEEE Standards.
 2. The study input data shall include the utility company's short-circuit single-and three-phase contribution, with the X/R ratio, the resistance and reactance components of the branch impedance, motor contributions, base quantities selected, and all other applicable circuit parameters.
 3. Short-circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at the main switchboard bus, building switchboards, distribution panels, panelboard, and other significant locations through the system.
- D. Equipment Evaluation Study:
1. An equipment evaluation study shall be performed to determine the adequacy of circuit breakers, controllers, surge arresters, switches, and fuses by tabulating and comparing the short-circuit ratings of these devices with the available fault currents. Any problem

areas or inadequacies in the equipment shall be promptly brought to the Architect's attention.

- E. Protective Device Coordination Study:
1. A protective device coordination study shall be performed to select or to check the selections of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated voltage and current transformers, and low-voltage breaker and fuse trip characteristics and settings.
 2. The study shall also encompass the low-voltage distribution system, including the 120/208V system including all feeder breakers 100A rating or higher. The phase and ground overcurrent protection shall be included, as well as settings for all other adjustable protective devices.
 3. The time-current characteristics of the specified protective devices shall be plotted on appropriate log-log paper. The plots shall include complete titles, representative one-line diagram and legends, associated Campus Utility relays or fuse characteristics, significant motor starting characteristics, complete parameters of transformers, complete operating bands of low-voltage circuit breaker trip curves, and fuse curves. The coordination plots shall indicate the types of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, ANSI transformer magnetizing inrush and withstand curves per ANSI C37.91, cable damage curves, symmetrical and asymmetrical fault currents. All requirements of the current National Electrical Code shall be adhered to. Reasonable coordination intervals and separation of characteristics curves shall be maintained. The coordination plots for phase and ground protective devices shall be provided on a complete system basis. Sufficient curves shall be used to clearly indicate the coordination achieved to the main breaker or fused device, the feeder breaker, and the primary protective device.
 4. The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system. Discrepancies, problem areas, or inadequacies shall be promptly brought to the Architect's attention.
- F. Study Report:
1. The results of the power system study shall be summarized in a final report. Five (5) bound copies of the final report shall be submitted to the Architect.
 2. The report shall include the following Sections:
 - a. Description, purpose, basis, written scope, and a single-line diagram of the portion of the power system, which is included within the scope of study.
 - b. Tabulations of circuit breaker, fuse, and other equipment ratings versus calculated short-circuit duties, and commentary regarding it.
 - c. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding it.
 - d. Fault current tabulations including a definition of terms and a guide for interpretation.
 - e. Tabulation of appropriate tap settings for relay seal-in units.

PART 3 - EXECUTION

3.1 GENERAL

- A. Refer to section 26 05 00 for details of work under this section.

3.2 INSTALLATION/APPLICATION/ERECTION

- A. Electric Service: Electric Service: Contact the local electric utility company service planning representative and coordinate with and arrange with the utility company for electric service to the project, including finalization of service application as required. Furnish and install all materials and labor necessary for complete installation as noted on drawings. Submit shop drawings and obtain approval from the utility company prior to fabrication. Also provide and install temporary power as required for construction operations.
- B. Telephone Service: Contact the local telephone utility company service planning representative and coordinate with and arrange with the telephone utility company for telephone service to the project, including finalization of service application as required.

Furnish and install all materials and labor necessary for complete installation as noted on the drawings and as required by the utility company.

- C. Cable TV Service: Contact the local cable utility company service planning representative and coordinate with and arrange with the utility company for cable TV service to the project, including finalization of service application as required. Furnish and install all materials and labor necessary for complete installation as noted on the drawings and as required by the utility company.
- D. Pay all costs chargeable to Owner for installation of new utility services.
- E. Excavate and trench as necessary for the electrical installation, and when the work has been installed, inspected and approved, backfill all excavations with clean earth from excavation, or imported sandy soil in maximum 8" (eight-inch) layers, moisten and machine tamp to 95% compaction, and restore the ground and/or paving or floor surfaces to their original condition.
- F. Switchboard and Distribution Panels Installation: Provide mounting channels for grouting into floor. Channels shall be properly drilled to receive the switchboard placed flush in floor, leveled and secured in place prior to pouring of floor, of length as required for switchboard. Bolt or weld switchboard to channels.
- G. Motor Connections:
 - 1. Install motor circuits complete for all motors by other trades
 - 2. Furnish and install all disconnect switches, outlet boxes, etc., as required by code.
 - 3. All motor and temperature control low voltage wiring shall be installed and connected by Division 15 Section of specifications, unless otherwise indicated on electrical drawings.

3.3 TESTS

- A. Testing and Inspection: See Section 26 08 00 - Testing.

* * *

BASIC ELECTRICAL MATERIALS AND METHODS

Section 26 27 00

PART 1 - GENERAL

1.1 WORK INCLUDED

- A Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below:
 - 1 Raceways, feeders, branch circuit wiring, wiring devices, safety switches and connections to all equipment requiring electric service.
- B Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
- C All work shall comply with Section 26 05 00.

1.2 RELATED WORK

- A Division 9 - Finishes
- B Division 23 - Motors and Mechanical Equipment Installation

1.3 SUBMITTALS

- A Comply with the provisions of Section 26 05 00 - Basic Electrical Requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A Refer to Section 26 05 00, Basic Electrical Requirements, Part 2 - Products.

- B List of Equipment Manufacturers:

Conduit and Conduit Fittings

Allied Tube and Conduit
Western Tube and Conduit
LTV Steel Tubular
National Electric Products
AFC
Republic Steel Corporation
Rome Cable Corporation
United States Steel Corporation
Killark Electric Manufacturing Company
Raco
VAW Aluminum Company
Bridgeport
Steel City
Thomas & Betts
Carlson
O.Z. Gedney
Appleton
Regal

Wire and Cable (600V)

American Wire Company
General Wire and Cable Corporation
Okonite Company
Rome Cable Corporation
Cerrowire
American Insulated Wire
AFC Cable Systems
Essex
Simplex Wire and Cable Company

Solderless Lugs and Grounding Connections

Burndy Engineering Company, Inc.
O.Z. Gedney Company, Inc.
Penn Union Electric Corporation
Thomas and Betts Company, Inc.

Pull Boxes, Gutters, Special Cabinets

Square D Company
Columbia Electric Manufacturing Company
General Electric Company
Westinghouse Electric Corporation
Circle Awalt

Outlet Boxes

Appleton Electric Company
Killark Electric Manufacturing Company
Lew Electric Fittings Company
National Electric Products Corporation
Raco
Steel City Electric Company
Carlson
Bowers

Floor Boxes

Steel City Electric Company
Harvey Hubbell, Inc.
RCI
Walker

Wiring Devices

Leviton
Arrow-Hart
Harvey Hubbell, Inc.
Lutron
Bryant

Conduit Racks, Hangers

General Electric Company
Killark Electric Manufacturing Company
Caddy
National Electric Products Corporation
Republic Steel Corporation
Rome Cable Corporation
United States Steel Corporation
VAW Aluminum Company
Superstrut
B-Line

Safety Switches (Disconnect and Fusible)

Square D Company
Cutler Hammer, Inc.
General Electric Company
Westinghouse Electric Corporation

Fuses

Bussman Manufacturing Company
Chase-Shawmut Company

Firestopping

3M
Nelson

2.2 MATERIALS

- A Raceways: Only the raceways specified below shall be utilized on this project. Substitutions shall be pre-approved in writing. All bare conduit ends (stub-ups or stub-outs) shall be provided with bushed ends or manufactured insulated throat connectors:
- 1 Rigid Type - hot dip galvanized or sherardized steel, use on all exterior locations, below grade or in concrete slab, and to 18" on either side of structural expansion joints in floor slabs (see item 15 below), with completely watertight, threaded fittings throughout.
 - a All rigid steel conduit couplings and elbows in soil or concrete or under membrane to be ½ lap wrapped with Scotch #50 tape and threaded ends coated with T&B #S.C.40 rust inhibitor prior to installation of couplings.
 - b All rigid steel conduit stub-ups from slab or grade to 6" above finished grade level shall be Robroy or Ocal coated only.
 - 2 In lieu of rigid steel conduit for power and control raceways and branch circuit conduits in soil or concrete slabs, "Schedule 40" PVC with Schedule 80 PVC conduit elbows and stub-ups may be used with code size (minimum No. 12) ground wire. A "stub-up" is considered to terminate 6" above the finished surface.
 - a Schedule 80 PVC conduit shall be used in all concrete footings or foundations and to 18" of either side of footings or foundation walls.
 - b Schedule 80 PVC conduit shall be used in all concrete masonry unit (CMU) walls or columns.
 - c All conduit runs in concrete floor slabs (where allowed) shall be installed to comply with all applicable UBC and structural codes to maintain the structural integrity of the floor slab. Where conflicts occur, alternate routing shall be provided at no additional cost to the Owner.
 - 3 Intermediate metal conduit shall be used in all exposed interior locations, except that electrical metallic tubing may be used in some locations as noted below. Utilize steel compression type fittings for all exposed conduit runs, unless otherwise noted. Cast fittings are unacceptable.
 - 4 Electrical metallic tubing may be used exposed in electrical and mechanical rooms and in unfinished spaces and in concealed and furred spaces, made up with steel watertight or steel set screw type fittings and couplings. Set screws shall have hardened points. Cast fittings are unacceptable.
 - 5 Use flexible conduit for all motor, transformer and recessed fixture connections, (minimum 3/4"); "Seal- tite" type used outdoors, and in all wet locations, provide with code size (minimum No. 12) ground wire in all flexible conduit. No flex conduit in walls – EMT or better only. Flex conduit to be Robroy or Ocal PVC coated for corrosion protection.
 - 6 Conceal conduit in ceiling, or walls of all areas where possible, all exposed conduits installed parallel to building members.
 - 7 Fasten conduits securely to boxes with locknuts and bushings to provide good electrical continuity.

- 8 Provide chrome escutcheon plates at all exposed wall, ceiling and floor conduit penetrations.
 - 9 Support individual suspended conduits with heavy malleable strap or rod hangers; supports for ½ inch or ¾ inch conduit placed on maximum 7-foot centers; maximum 10-foot centers on conduits 1 inch or larger.
 - 10 Support multiple conduit runs from Kindorf B907 channels with C-105 and C-106 straps.
 - 11 Conduit bends - long radius.
 - 12 Flash conduits through roof, using approved roof jack; coordinate with General Contractor.
 - 13 To facilitate pulling of feeder conductors, install junction boxes as shown or required.
 - 14 All empty conduits on the project shall be provided with a nylon pull rope to allow pulling of future conductors intended for the specific raceway. Provide plastic wire-tie style nameplate tags on each end of pull rope with printed identification of conduit use and the location of the opposite end of the rope. Pull ropes for telephone and cable tv service conduits shall meet the respective utility company requirements.
 - 15 Where conduits pass through structural expansion joints in floor slab, rigid galvanized conduit shall be used 18" on either side of joint, complete with Appleton expansion couplings and bonding jumpers, or equal. All above grade expansion joint crossings shall also utilize expansion joint couplings or flex conduit transitions as required for each particular installation. No solid conduits shall be allowed to cross expansion joints without proper provisions for building and seismic movement.
 - 16 Minimum cover of conduits in ground outside of building - 36 inches, unless otherwise noted.
 - 17 Provide and install exterior wall conduit seals and cable seals in the locations listed below. Coordinate installation and scheduling with other trades:
 - a Conduit seals through exterior wall or slab (below grade): O.Z. Gedney series "FSK" in new cast in concrete locations, series "CSM" in cored locations.
 - b Conduit seals through exterior wall or slab (above grade): O.Z. Gedney series "CSMI."
 - c Cable seals at first interior conduit termination after entry through exterior wall or slab: O.Z. Gedney series "CSBI." Coordinate quantity of conductors at each location.
- B Outlet Boxes and Junction Boxes. Verify all backbox requirements with devices to be installed prior to rough in.
- 1 One-piece steel knockout type drawn boxes, unless otherwise noted, sized as required for conditions at each outlet or as noted.
 - 2 Flush-mounted boxes equipped with galvanized steel raised covers for device mounting flush with finished surface. Provide extension rings as required on all acoustical or additional wall treatment areas to bring top of cover flush with finished surface (coordinate with architectural drawings). Devices shall be capable of being tightly mounted to boxes without distorting or bending device or mounting hardware.
 - 3 Boxes for fixture outlets: 4-inch octagon or larger as required, or as noted.
 - 4 Switch and receptacle outlets - not smaller than 4-inch-square in furred walls, with raised cover for single device; ganged where required.
 - 5 Outlet and switch boxes for wet locations, cast aluminum FS or FD type with cast aluminum gasketed spring lid cover. Weatherproof "Bell" type boxes are not acceptable.
 - 6 All connectors from conduit to junction or outlet boxes shall have insulated throats. Connectors shall be manufactured with insulated throats as integral part. Insertable insulated throats are unacceptable.
 - 7 Outlet boxes for cable TV, telephone/data, 4" square or larger as required or noted, multi-ganged for telephone, data, and other services where indicated on the drawings.
 - 8 Conduit Bodies: Malleable iron type, with lubricated spring steel clips over edge of conduit body, O-Z/Gedney type EW, or equal.

- 9 Floor Boxes:
 - a Classification and Use: Floor boxes shall have been examined and tested by Underwriters Laboratories Inc. to meet UL514A and Canadian Standard C22.2 and shall bear the appropriate label. Floor boxes shall conform to the standard set in the National Electrical Code. Multi-compartment boxes shall have been evaluated by UL to meet the applicable U.S. and Canadian safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.
 - b Multi-Compartment Boxes:
 - (1) Boxes shall be fully adjustable, providing a maximum of 1-7/8 (RFB4) 2" (RFB9/RFB11) inch pre-pour adjustment, and a maximum of 3/4 inch post-pour adjustment.
 - (2) Boxes shall provide a series of device mounting plates that will accept both duplex power devices, as well as plates that will accommodate connectivity and AV outlets with modular inserts.
 - (3) The box shall provide 3/4", 1" and 1 1/4" conduit size openings with 2" KO for larger size boxes.
 - (4) Cover shall be cast aluminum. Lid shall be offered with solid, flush surface for tile, wood or terrazzo and an insert option for carpet inlay.
 - (5) Cover options shall support loads from 390LBS to 3000LBS
 - (6) Use cast iron boxes for on-grade applications (RFB4-CI-1). Stamped steel allowed for above grade applications (RFB-4 and RFB-4DB).
 - 10 Pull boxes: All site pull boxes shall be flush in-ground concrete, with engraved concrete lids identifying service use (i.e. electrical, signal, fire alarm, etc.). Christy or equal with all required extensions to provide box and conduit depths shown or required.
 - a Provide concrete covers for all boxes in planted or paved areas (up to available concrete cover size).
 - b Provide galvanized steel covers for all larger boxes (when concrete is not available), or in traffic areas. No cast iron covers.
 - c Provide galvanized steel H20 rated covers and installation of box rated for H20 in all traffic areas.
 - d All covers to be completely flush with finished adjacent surfaces.
 - e Provide bolted covers and slab bottoms (with grouted perimeter) or vault type boxes for all electrical distribution and signal system pull boxes used for site distribution. Branch circuit power or signal pullboxes may be collars and tops only (no slab bottom required).
 - f Provide pullboxes per utility company specifications for all electrical primary and secondary services and for cable TV and telephone service runs. Verify exact size and type prior to order with each utility company.
- C Wire and Cable:
- 1 600-volt class where used for or run with line voltage power wiring, insulation color coded, minimum No. 12 awg for power branch circuits, No. 14 for power control circuits, and wiring size and type as directed by signal system manufacturer for each signal system.
 - 2 All conductors shall be stranded copper.
 - 3 Insulation type:
 - a Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75-degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
 - b High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in NEC table 310-13.
 - 4 Conductors unless otherwise noted on drawings shall be stranded. All conductors #10 or smaller shall be stranded.

- 5 Provide signal system wiring for each system to meet the system manufacturers requirements and recommendations for each device or equipment type. Signal wiring systems shall be provided with shielding and/or insulation type and cable quantities as directed by the manufacturer, and meet all NEC requirements for locations used.
 - 6 Install all wiring (low voltage and line voltage) in conduit unless noted otherwise in the drawings, but do not pull into conduit until plastering and taping have been completed and conduits and outlets have been thoroughly cleaned and swabbed as necessary to remove water and debris.
 - 7 Megger test all feeders prior to energizing. See section 26 08 00 for additional information.
 - 8 Approximately balance branch circuits about the neutral conductors in panels.
 - 9 Connections to devices from "thru-feed" branch circuit conductors to be made with pigtails, with no interruption of the branch circuit conductors.
 - 10 Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.
 - 11 Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
 - 12 All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

Voltage	Phasing	A	B	C	N
120/208	3PH4W	Black	Red	Blue	White
208	3PH3W	Black	Red	Blue	--
 - 13 The equipment-grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
 - 14 Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.
 - 15 Provide permanently affixed adhesive labels with machine printed lettering (min. 1/8" high) at junction boxes serving fixtures that are supplied by (2) electrical sources (i.e. normal and emergency lighting). Label to read "CAUTION - This light fixture is powered by (2) separate sources. The normal power source breaker and the emergency power source breaker must be turned off before servicing this light fixture."
 - 16 Install feeder cables in one continuous section unless Architect approves splices. Exercise care in pulling to avoid damage or disarrangement of conductors, using approved grips. No cable shall be bent to smaller radius than the spool on which it was delivered from the manufacturer. Color code feeder cables at terminals. Provide identifying linen tags in each pullbox.
- D Switches: Model numbers are Hubbell or equal, color to be selected by architect, unless otherwise noted. All devices connected to the generator system shall be red. All switches to utilize screw terminals for wire connections – no plug-in terminations:
- 1 Single Pole - No. 1221 or equal
 - 2 Three Way - No. 1223-2W or equal
 - 3 Momentary contact - No. 1557 or equal
 - 4 Pilot Light (on with load on) – No. 1221-PLC, or equal.
 - 5 Motor Rated Double Pole – No. 7832, or equal.
 - 6 Motor Rated Three Pole – No. 7810-UD, or equal
- E Receptacles: Mounting straps and contacts shall be one piece design, (no rivets), constructed of minimum .050" solid brass. Base shall be high strength, glass reinforced nylon. Device shall accept up to #10 wire. Model numbers are Leviton or equal, color to be selected by architect, unless otherwise noted. All devices connected to the generator system shall be red.
- 1 20A 3PG 125 volt duplex - No. 5362

- 2 20A 3PG 125 volt ground fault interrupter receptacle, no indicator light, with safety lock-out action - No. 8899-W or equal. Through wiring to down stream GFI designated receptacles is not acceptable.
 - 3 Special appliance receptacles: Match NEMA configuration of equipment plug.
 - 4 Clock Hanger 20A 3PG 125 volt receptacle, with stainless steel plate. Hubbell #5361-CH, or equal.
- F Plates: Leviton, or equal, except as noted:
- 1 The color of all faceplates shall match the color of the devices installed under/in the faceplate, except as specifically noted otherwise. Devices connected to emergency power shall be Red and engraved "EMERGENCY".
 - 2 For flush outlet boxes, for switches, and receptacles: nylon, color to be selected by architect, unless otherwise noted.
 - 3 Plates for surface-mounted outlets: galvanized steel unless otherwise noted.
 - 4 Weatherproof duplex receptacle plates for exterior locations with ground fault interrupter receptacles in type FS or FD boxes – Appleton #FSK-1VDR or compatible equal. Verify cover compatibility with box type and device installed.
 - 5 Weatherproof "in-use" cover, vertical or horizontal mount, for exterior with GFCI receptacles in type FS or FD boxes – Die-cast metal alloy, Taymack MX series or equal with openings to match installed devices.
 - 6 Locking plates for duplex receptacles where noted; Pass & Seymour #WP26-L (non weather proof).
 - 7 Locking plates for duplex exterior GFCI receptacles (or in wet or damp locations); Heavy duty cast aluminum flush cover with locking latch and key, Pass & Seymour #4600 with appropriate mounting plate for type of device installed. Coordinate backbox requirements and finished wall trim out with wall installer prior to rough in to insure an adequate and neat trim appearance upon completion.
- G Equipment Disconnects: All disconnects shall be located to allow proper code required clearance in each area. Locations shown on drawings are diagrammatic only. The contractor shall coordinate exact locations in the field (with other trades) prior to rough-in to insure proper clearances.
- 1 Motor Disconnect Switches and Safety Switches: General Electric Company Heavy Duty Type "THD", cover interlocked with operating handle so that cover cannot be opened with switch in closed position and switch cannot be closed with cover in open position. 240V rating, single or multi-pole as required or as noted on drawings, in Nema 1 enclosure indoors or Nema 3R enclosure outdoors unless otherwise noted. Provide dual element motor circuit fuses sized as recommended by equipment manufacturer (for final equipment actually installed).
 - 2 Code required disconnects: Provide a local disconnect in addition to the branch circuit protection device for all equipment as required by code (whether shown or not). Disconnects shall consist of a motor rated switch (or disconnect) for all motor loads less than 3/4HP or other suitable disconnect sized to match branch circuit conductors and load current of equipment, with number of poles as required.
- H Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; "Scotchlock" fixed spring type with insulator for No. 6 and smaller wire.
- 1 All splices made up with wire nut connectors shall be solidly twisted together with electricians pliers before connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.
 - 2 Connectors listed or labeled for "no wire twisting required" are not an acceptable substitute for actual wire twisting.
 - 3 Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).
- I Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.
- 1 Provide watertight cast splices for all conductors in site pullboxes or wet locations.
- J Identification: Refer to Section 26 05 00.

- K Firestopping: As manufactured by 3M Fire Protection Products or equal.
 - 1 Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, and at other construction gaps.
 - 2 Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.
- L Emergency Power Off: Shall be red pushbutton with extended guard mounted in stainless steel plate, with engraved plastic nameplate, red with white lettering, with Plexiglas hinged cover over entire unit, Square D Type K operator or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A Refer to Basic Electrical Requirements - Section 26 05 00 Basic Electrical Requirements for work under this Section.

3.2 TESTS

- A Testing and Inspection: See Section 26 08 00 - Testing.

* * *

PHOTOVOLTAIC SYSTEM

Section 26 31 01

PART 1 – GENERAL

1.1 DESCRIPTION

- A The Contractor shall include in their bid all additional design and engineering costs associated with the PV system design to be submitted, including all materials, installation, testing, utility company coordination, and training.

1.2 WORK INCLUDED

- A Work included in this Section: All design, materials, labor, equipment, services, and incidentals necessary to install a complete Photovoltaic (PV) System as specified hereinafter, including but not limited to the work listed below.
- B The system shall be utility grid connected with no storage batteries. The contractor shall be responsible for all required utility company coordination, approval, and applications for the complete interconnection of the PV system with the utility company grid, including bi-directional utility meter.
- C It will be the contractor's responsibility to provide a recommendation, based on supporting documentation, to the Client, the option that will maximize greatest financial and energy return.

1.3 SCOPE

- A The system shall consist of an array of framed photovoltaic modules, all mounting hardware, terminal boxes and combiner panels, quick-connect electrical connectors, DC wiring, DC disconnects, utility interactive inverter, AC disconnect, isolation transformer, AC feeder, main PV system disconnect, MET station, and a complete data acquisition and monitoring system to allow the Owner to monitor and utilize the collected data over the Owner network.
- B The work shall include furnishing all labor, materials, and equipment necessary to form a complete installation, ready for operation to produce solar power at the site.
- C The installing contractor shall be responsible for adequate clearance and equipment space within the allotted roof area and existing interior building area. All equipment and sizes / clearances shall be coordinated with the architect and Owner prior to rough-in.
- D The system installer shall submit for and pay for the required permits and inspections with the local AHJ and utility company.
- E The installer shall complete all of the required paper work for the utility interconnection agreement contract in conjunction with the Owner's input and approval, including rate schedule (i.e. TOU or other) designations. In order for the Installer to act on behalf of the Owner, the Installer (in conjunction with the Owner) shall submit to the utility company the proper authorization forms.
- F The installer shall also be responsible for and submit for, pay filing fees, and obtain any relevant buy-down incentive rebates available for the system and properly credit the value to the Owner. This shall include application (and payment) of all required "reservation" applications as well as system applications and system certification and testing with the utility company to receive the final rebates.
- G The incentives and other credits may be claimed buy the Installer / Contractor if properly identified and allotted for in the Bid price and contract (for credit to the Owner).
- H System installation shall include the programming, set-up, and commissioning of a web based data acquisition system and interactive data application to allow public viewing of the real-time system performance and past historical performance.

1.4 WARRANTIES

- A The system shall be warranted by for a period of five (10) years from system start-up and acceptance by the Owner.
- B The photovoltaic panels shall be covered by the manufacturer's warranty for a minimum of 25 years.
- C The inverters shall be covered by the manufacturer's warranty of 10 years.
- D System installation shall be such that it does not affect the roof warranty.

1.5 APPLICABLE GUIDELINES / REGULATIONS / STANDARDS

- A CPUC approved Electric Rule 21 – Generating Facility Interconnections
- B UL1741 (Inverters, Converters, and Controllers for Independent Power Systems)
- C UL1703 (Standard for Flat-Plate Photovoltaic Modules and Panels).

- D IEEE 929 (2000) – Recommended Practice for Utility Interface of Photovoltaic (PV) Systems.
- E IEEE 1262 (1995) – Recommended Practice for Qualifications of Photovoltaic (PV) Modules.
- F NEC Articles 690 and 702.
- G CAL Fire - Solar Photovoltaic Installation Guidelines

1.6 QUALITY ASSURANCE

- A Underwriters' Laboratories shall certify the system.
- B Contractor Qualification – The contractor shall be approved by the PV equipment manufacturer(s) to install the PV materials.

1.7 SUBMITTALS

- A Submit the following for approval:
 - 1 Roof plans with the PV System layout (based on submitted panel).
 - 2 Single line Diagrams indicating all required connections and utility tie-in.
 - 3 Array calculations including string design, string amperage, array amperage (including short circuit currents), and DC voltages (maximum and minimum based on coldest record low and average high ambient temperatures).
 - 4 DC combiner boxes with fusing.
 - 5 DC/AC Inverter(s).
 - 6 Isolation Transformer (if applicable).
 - 7 WH Meter and Logger.
 - 8 Data Acquisition System.
 - 9 PV System weights.
 - 10 PV Modules.
 - 11 Installation Manuals.
 - 12 Operation and Maintenance manuals.
 - 13 Web based data acquisition system and application software.
 - 14 Mounting hardware.
 - 15 Wiring (AC and DC).
 - 16 Disconnects.
 - 17 Placards (with all code and utility required designations).
 - 18 Testing and certification / commissioning results (upon completion).

1.8 DELIVERY, STORAGE, AND HANDLING

- A All equipment and panels shall be handled with care so as not to damage the delivered products. All equipment shall be installed in new and neat condition.
- B Appropriate protective clothing shall be worn when handling the equipment. Such clothing shall include hard hats and steel-toe boots when lifting materials to roof, and insulated gloves when working on an active system.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A Acceptable system manufacturers/vendors shall have been in the business of producing and/or installing similar commercial grade solar photovoltaic systems for the last 5 years minimum (50 kW systems or higher). Manufacturers shall provide their latest line of equipment, meeting all current industry standards.
- B The basis of design for the minimum performance of the system is the Sharp #NU-U240F2 module with SMA Inverter, with characteristics as outlined below.
- C Other modules and equipment are acceptable when meeting the minimum system performance listed herein and complying with all other technical aspects of the system as listed herein.

2.2 MATERIALS

- A The PV modules used in the basis of design have the following physical properties and are pre-approved. Alternate modules shall have similar values:
 - 1 Module Weight - 38 lbs. max. each
 - 2 Module Dimensions - 58.4" x 39" x 1.4" max.
 - 3 All PV modules shall be UL 1703 listed.

- B The following Electrical Module characteristic shall be used as a minimum standard for any design submitted.
- 1 Power Output (Pmax) - 240 Watts; STC
 - 2 Open Circuit Voltage (Voc) – 37.4 Volts; STC
 - 3 Maximum Power Voltage (Vmp) – 30.1 Volts; STC
 - 4 Short Circuit Current (Isc) - 8.65 Amps; STC
 - 5 Maximum Power Current (Imp) - 7.98 Amps; STC
- C The inverter shall be by Satcon, SMA America, Solaron, or equal, sized as required to support the PV module production load within the rating of the equipment, together with all other components as follows. All inverters shall be CEC approved and shall be utility line interactive type:
- 1 Nominal AC Voltage (1-phase, arranged for balanced 3-ph system + 10%)
 - a 208 VAC
 - b Nominal AC Frequency (+ 0.5 Hz)
 - (a) 60 Hz
 - c Line Power Factor (Above 20% rated power)
 - (a) >0.99
 - d AC Current Distortion (At rated power)
 - (a) <5% THD
 - e Maximum Open Circuit Voltage DC
 - (a) 600 VDC
 - f Power Tracking Window Range
 - (a) No higher than 315 VDC (low end) to a maximum of 600 VDC (high end).
 - g Maximum Ripple Current (% of rated current)
 - (a) <5%
 - h Peak Inverter Efficiency
 - (a) >95%
 - i Standby Tare Losses
 - (a) <70 watts total
 - j Temperature Range Ambient
 - (a) -4° F to 122° F (-20° C to 50° C)
 - k Enclosure Environmental Rating
 - (a) NEMA 3R
 - l Enclosure Environmental Rating
 - (a) Galvaneal folded steel enclosure
 - m Relative Humidity (non-condensing)
 - (a) 0-95%
 - n Sound level
 - (a) <65dB(A)
 - o Array Configuration
 - (a) Negative or Positive grounded
 - p Cooling Method
 - (a) Forced convection cooling
 - q Protective Functions
 - (a) Standard wakeup voltage, wakeup time delay, shutdown power, shutdown time delay, AC over / under voltage and time delays, AC over / under frequency and time delays, ground over current, over-temperature, AC and DC over current, DC over voltage
 - r User Display
 - (a) Standard-LCD with on/off capability
 - s AC Disconnect
 - (a) Load break and back feed rated
 - t DC Disconnect
 - (a) 600 VDC load break rated
 - u Isolation Transformer (where used)
 - (a) High efficiency mounted within same enclosure
 - v Communications Software

- (a) Serial communications and control software
 - (b) UL 1741 listed.
 - (c) Zone 4 Seismic Rating.
 - (d) Internal combiner panel to allow connections of sub-arrays at the Inverter without the use of additional equipment.
 - (e) Provide a placard on the Inverter per section 3.1 below.
- D Inverter to electric service equipment interface shall be as follows:
- 1 120/208 VAC, 3-Phase, 4-Wire, 60Hz.
 - 2 Connected on the supply side of the main switch per 2008 NEC 690.64(A).
 - a If a GFP or bussing / breaker conflict exists with the existing equipment, the PV systems shall be connected on the line side of the main and GFP systems per 2008 NEC 690.64(A).
 - b Provide a placard on the Main Switchboard to identify the two sources of power feeding the equipment. Also provide a placard identifying the inverter breaker position and its intended purposes and location. Refer to section 3.01 below.
- E All AC interconnecting feeders shall be sized to NEC Table 316 (75 degree column) based on associated disconnect amperage. Conduit fill to 40% max. Include temperature derating as required for the ambient temperatures and roof conditions per NEC. Provide equipment grounding conductor in each conduit.
- F All AC circuits to be 3-wire + ground. All grounding per NEC 690, Part V.
- G All DC circuits and feeders sized to NEC table 316 (90 degree column) based on associated disconnect amperage. Minimum ampacity shall be 156% of the rated short circuit current available to be carried on the specific conductor. Conduit fill to 40% max. Include temperature derating as required for the ambient temperatures and roof conditions per NEC. Provide equipment grounding conductor in each conduit.
- H All DC circuits to be 2-wire + ground.
- I All AC and DC wiring in conduit to be RHW-2, THWN-2, or XHHW-2 (90 degree) wet rated for use with 90 degree listed terminals on PV equipment.
- J All exposed DC wiring to be USE-2 or SE (90 degree) wet rated and sunlight resistant.
- K All above ground exposed conduit shall be rigid galvanized steel or aluminum with threaded fittings or painted EMT with water-tight compression fittings. All interior conduit to be EMT with steel set-screw fittings (no cast fittings).
- 2.3 ARRAY MOUNTING
- A Modules shall be roof mounted, flat to the standing seam roof surface, with appropriate racking hardware and structural attachments.
 - B Provide structural engineering calculations and/or certifications that the design meets the requirements of the existing building structure and can be adequately supported.
- 2.4 WIND LOADING
- A The system shall minimize wind loading by mounting the modules flat to the roof.
 - B Provide structural engineering calculations and/or certifications that the design meets the requirements for wind loading and can be adequately supported and maintained on the roof.
- 2.5 MISC. SYSTEM REQUIREMENTS
- A All exterior equipment to be sunlight and UV resistant as well as rated for elevated temperatures at which they are expected to operate (on roofs in hot sunlight).
 - B Heavy duty urethane sealants shall be used for all non-flashed roof penetrations.
 - C No dissimilar metals allowed to contact (use plastic or rubber washers)
 - D No aluminum in contact with concrete or masonry materials.
 - E Use high quality stainless steel fasteners only.
 - F Structural members for PV supports should be corrosion resistant aluminum (6061 or 6063), hot dipped galvanized steel (per ASTM A 123), coated or painted steel (in non-corrosive environments only), or stainless steel (in corrosive environments).
 - G All PV modules to be installed such that they are 100% free from shade between 8am and 5pm daily.
- 2.6 SYSTEM ELECTRICAL
- A The modules shall be interconnected using cable assemblies. The pigtails shall be quick-connect electrical wiring connections rated for the application (90 degree rated).

- B The array shall have at least one terminal box, providing a watertight entry to the raceway system leading to the combiner box and Inverter(s).
- C Full specifications of the inverter shall be supplied as part of the system submittal.
- D All major components of the systems and the installation procedures shall meet National Electrical Code requirements, including Article 690.
- E The inverters shall automatically drop-off-line when normal utility power is lost to avoid un-intentional islanding effects. Drop-off to be activated by over-voltage (110%) and under-voltage (88%), and shall be adjustable. Frequency drifts outside 59.3 to 60.5 Hz for more than 10 cycles shall also activate automatic drop-off. Automatic reconnection shall not occur until the normal utility power has been stable for at least 60 seconds.
- F All electrical system equipment shall be properly rated to withstand and interrupt (in the case of over current protection devices) the available fault current at the point of use.
- G The system shall be capable of operating between a power factor of 0.9 lagging to 0.9 leading.
- H All required overcurrent protection and electrical bussing sizes per NEC 690.
- I Provide a grounding electrode connection from the inverter assembly to the nearest building steel per NEC 690.45 and the manufacturers instructions. Inverters shall have GFCI protection, allowing grounding per NEC Table 250.122.
- J The Main PV System Disconnect (adjacent to the main service panel) shall be clearly labeled and located within 10 feet of the main service meter location per Utility Company requirements.

2.7 MONITORING

- A A Data Acquisition and Monitoring System shall be provided as part of the System. The system shall allow measurement, calculation, and display of the following items (at minimum):
 - 1 Ambient temperature
 - 2 Wind speed
 - 3 Solar irradiation
 - 4 System electrical functions (instantaneous and accumulated power output (kW and kWh), AC and DC system voltage and amperage, and peak value tracking with associated time stamps).
 - 5 Pounds of Co2 emissions avoided from the generation of PV energy at the site (compared to conventional coal and gas production methods).
- B Provide a Web based software application to allow interactive display and user requests of system performance, including historical data.
- C Provide a MET station located within proximity to the PV array.
- D Load software on owner provided web page (URL) and train owner in operation and maintenance of software and related monitoring functions.

PART 3 - EXECUTION

3.1 REQUIRED PLACARDS

- A All placards shall be machine generated phenolic type with red background and white lettering, affixed to equipment with stainless steel screws (no adhesives allowed). Minimum lettering size to be 1/4" unless otherwise noted or required for legibility.
- B Provide a placard clearly visible at each main service panel or switchboard to identify both sources of power, with the following wording in 1/4" high lettering per NEC 690.64(B)(4): "Warning - This Service Is Fed By Two Sources Of Power - The Utility Service Main Disconnect And The PV System Main Disconnect - Both Services Must Be Disconnected To Remove Power From The Panel (Switchboard)".
- C Provide a placard on the PV system input circuit breaker at each main service panel or switchboard with the following wording in 1/4" high lettering per NEC 690.64(B)(7): "Warning - Inverter Output Connection - Do Not Relocate This Overcurrent Device".
- D Provide a placard on all disconnects with the following wording in 1/4" high lettering per NEC 690.17: "Warning - Electric Shock Hazard - Do Not Touch Terminals - Terminals On Both The Line and Load Sides May Be Energized In The Open Position".
- E Provide a placard on each Main PV System Disconnect (adjacent to each main service panel or switchboard) with the following information in 1/4" high lettering per NEC 690.53: "Photovoltaic Power Source Disconnect - Operating Current: XX Amps; Operating voltage: 480 VAC; Maximum System Voltage: 480 VAC; Short-Circuit Current: XXX Amps", where XX is the maximum AC amperes of the installed system and XXX is the maximum short circuit current that can be delivered through that

device - usually the available utility system short circuit current at that location, or, only if noted on the drawings, the maximum short circuit current that the PV system can provide (from all strings in parallel).

- F Provide a placard at each main panel or switchboard with the following information in 1/4" High lettering per NEC 690.54: "Caution - Possible Backfeed From Photovoltaic Power System - 480V, XX Amps", where XX is the maximum AC amperes of the installed system.
- G Provide a placard on each PV System Inverter with the following information in 1/4" high lettering: "Photovoltaic Power Source Inverter Rating - Operating Current: XX Amps; Operating voltage: XXX VDC; Maximum System Voltage: 600 VDC; Short-Circuit Current: XXXX Amps", where XX is the maximum DC amperes of the installed system, XXX is the operating voltage DC, and XXXX is the short circuit current that the Inverter can provide (from all strings in parallel).
- H Provide utility-required system directory placard and utility safety switch identification placard as required by local utility company, to identify all system components.

3.2 UTILITY INTERCONNECTION

- A The PV generation system shall not be interconnected with the Utility's distribution facilities until written authorization from the Utility Company has been obtained. Unauthorized interconnections may result in injury to persons and damage to equipment or property for which the installing contractor and Owner may be liable.

3.3 INSTALLATION STANDARDS

- A System Installation shall conform to the equipment manufacturers Installation Manual(s) and requirements or guidelines.
- B All Local, State, and NEC codes shall be observed, including all industry standards related to the installation, operation, and maintenance of photovoltaic power systems.

3.4 TESTING

- A Photovoltaic modules shall be tested in the factory for design performance and results shall be included in the Operation and Maintenance manuals.
- B Inverters shall be factory tested for performance and the results shall be included in the Operation and Maintenance manuals.
- C System testing of the installed photovoltaic array shall be performed on all system strings and recorded in the Operation and Maintenance manuals.
- D Megger test each roof array prior to energizing to establish that no shorts or ground exist at any point on the arrays.
- E Testing to be performed per CPUC Electric Rule 21 testing procedures and requirements. All testing to be done on "no-cloud" days to avoid system fluctuation by passing clouds. Installer to provide all testing and certification / commissioning.
- F System start-up procedure will be as outlined by the Manufacturer's Installation Manual and the Inverter Manual.

* * *

STANDBY EMERGENCY ELECTRIC GENERATOR

SECTION 26 32 00

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide a complete integrated Standby Emergency Generator plus accessories assembly, as noted herein and as indicated on the Drawings.
- B. For CBC compliance, the Standby Generator supports critical equipment with an importance factor of 1.5. Provide Special Seismic Certification documentation as per CBC and ASCE/SEI requirements for all generator and associated equipment defined as 'critical' with an importance factor of 1.5, as per Paragraph 1.10 of Section 26 05 00 – Basic Electrical Requirements.
- C. The Manufacturer shall provide certification by an approved agency that the Standby Generator assembly, including all components, base fuel tank, vibration isolators, enclosure, mounting, and anchorage is CBC compliant. Manufacturer shall be responsible for providing a complete assembly of all components in one overall housing which is certified to comply as an integrated assembly with CBC requirements. Overall dimensions of the generator with housing shall not exceed area allotted on drawings, including all access clearances.
- D. Seismic installation of Standby Generator package: Based on Manufacturer's approved submittal, Contractor shall retain the services of a State of California registered Structural Engineer to prepare final installation details and drawings for equipment supports and attachments.
 1. Submit drawings of the equipment showing dimensions, support equipment, connections, and the proper anchorage locations.
 2. Equipment weight and weight distribution (e.g., center of gravity in elevation and plan).
 3. Seismic Vibration Isolation Devices: Manufacturer's product information indicating class and type. Indicate load ratings as published manufacturer's data or shop drawings. Indicate proper orientation of devices on plan.
 4. Specific details of restraints including anchor bolts and welds and maximum load at each location.
- E. Manufacturer shall provide technical assistance to Owner in securing all required local Air Quality Management District permits for installation of the Standby Emergency Generator.
- F. The Contractor shall include a Manufacturer-provided five-year engine-generator maintenance agreement as described herein as part of the bid. The maintenance agreement shall include two annual 2-hour 1.0 pf full-load test with a portable load-bank provided by the Manufacturer.

1.2 SUBMITTALS

- A. Refer to Section 26 05 00 – Basic Electrical Requirements for procedure.
- B. Tests and Reports (Test Requirements are detailed in Paragraph 1.4).
 1. Provide certified test reports of the following:
 - a. Factory tests.
 - b. Field Tests: Test reports shall include dates performed, method of testing, test results, test interpretation and recommended action.
- C. Shop Drawings and Product Data
 1. The following list includes the required Shop Drawing information that shall be submitted for the generator:
 - a. Physical dimensions and weights.
 - b. CBC Certificate of Compliance for all components and overall assembly.
 - c. Brake horsepower of engine.
 - d. Fuel consumption.
 - e. Cooling requirements.
 - f. Noise db level. Provide details of acoustical housing and factory testing to prove acoustical housing performance.
 - g. Electrical characteristics of generator, voltage regulator, and battery charger.
 - h. Load graphs.

- i. Control panel.
 - j. Elevation.
 - k. Remote Annunciator
 - l. Wiring and control diagrams.
 - m. Engine and generator details, including governor and base day tank.
 - n. Location of available parts and service.
 - o. Confirmation that engine meets the latest EPA Tier Exhaust Emission Compliance Statement, complies with latest CARB standards for emergency standby equipment, and complies with the local Air Quality Management District requirements.
 - p. Details of base-mounted day tank.
 - q. Certification that Generator Set is in compliance with California Fire Code Chapters 27, 34, & 312, and NFPA Chapter 30.
- D. Maintenance and operating instruction manuals, six bound copies, including approved shop Drawings, parts list, list of recommended spare parts, sources of purchase and similar information.
- 1.3 GUARANTEE
- A. Provide a written guarantee against all defects in materials and application, which prevent proper functioning for one (1) year from date of acceptance of the project.
- 1.4 TESTS
- A. Certified copies of factory test giving guaranteed performance characteristics to meet the Specifications should be furnished by the Manufacturer. The unit shall be tested at the Manufacturer's plant for performance of all functions including a 2-hour full load test, using 0.8pf reactive to 1.0pf resistive load banks and until all temperatures have been stabilized for at least 30 minutes.
- B. The Manufacturer shall have field tests made of the generator and wiring systems in place by a qualified factory technician. The complete engine generator set with all of its appurtenances shall be tested after installation for all functions, including a 2-hour full load test with full-rated resistive (1.0pf) load bank. The Manufacturer shall supply all equipment necessary for the tests.
- 1.5 FUNCTION
- A. The emergency generator shall function to start automatically immediately upon power failure of the normal power supply, assume full load within ten (10) seconds and automatically switch into the emergency power system. The unit shall be automatically removed from the line upon resumption of normal power and stopped five (5) minutes later.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General:
- 1. Provide and install a complete emergency power system, including power plant powered by diesel engine driven generator and operated by means of a signal from the building automatic transfer switch. The system shall be complete, tested and meet all the functional requirements of a fully automatic emergency power source serving full load power stabilized at rated voltage and frequency within three seconds after normal power source failure.
 - 2. The diesel engine generating set shall be fully automatic and shall be complete with starting and control equipment, critical grade muffler, base-mounted day tank, skid-mounted batteries, charger, acoustical enclosure, remote annunciator, and other equipment necessary to provide a complete, fully automatic system.
 - 3. Arrange for the services of a factory erection engineer for checking installation, making specified and all other necessary tests, making initial start, instructing operating personnel in operating unit through all of its functions to ensure that the unit is performing in accordance with the intentions of the Specifications.
 - 4. Manufacturers: Cummins-Onan, Generac, Kohler, or approved equal.

B. Power Plant:

1. Rating shall be based on continuous standby power rating of the generator and with capabilities to carry 100% full load without damage to the engine, generator or components, and with capabilities for starting the largest motor scheduled for the standby power system while carrying full connected load at an altitude of 350 feet above sea level. Full load power ratings shall be in KW (rating as indicated on the drawings) continuous standby at 0.8 PF at 120/208 V 3PH 4W.
 - a. Voltage regulation shall be +/-0.5% for any constant load between no load and rated load.
 - b. Frequency regulation shall be isochronous from steady state no load to steady state rated load.
 - c. The diesel engine generator set shall be capable of single step load pick up of 100% nameplate KW and power factor, less applicable de-rating factors, with the engine-generator set at rated operating temperature.
 - d. Under motor starting conditions the generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified KVA load at near zero power factor applied to the generator set.
 - e. Maximum transient voltage dip shall not exceed 35 percent below rated on application of the single largest surge load step.
2. Provide unit and all accessories in a common acoustical enclosure, with a common base for unit capable of skidding into place. Unless otherwise noted on the drawings, all accessories, including muffler and base-mounted day tank, shall be concealed within common generator enclosure. Provide sound absorbing enclosure to produce overall sound rating noted below.
3. Provide minimum 18" flexible section in all electrical, fuel and exhaust lines at connection to power plant.
4. Provide flexible steel disc coupling to engine-generator.
5. Provide lifting brackets.
6. Provide a CBC compliant and certified vibration isolation system. The vibration isolation system shall be designed to withstand the seismic forces from ground motions and installation shall comply with critical equipment (importance factor = 1.5) requirements. CBC conforming vibration isolators shall be provided and installed at the bolt-down locations between the skid and the concrete mounting pad.

C. Engine:

1. The engine shall be 4-cycle design, water-cooled; series turbo charged with after cool, having no inherent unbalanced reciprocating forces. Operating speed shall be 1800 RPM.
2. Starting by battery-driven starter. Include cranking sequencer, which shall give three (3) start attempts before locking out over-cranking protection.
3. Governor shall be isochronous electronic as required to maintain generated frequency at 60 Hz. at 75% full load within a steady state band-width of (+/-) 0.25%. Frequency shall not vary over 3% from no load to full load. Governors using engine crankcase lube oil will not be acceptable. Governor shall be type EFC, Electronic Isochronous.
4. Provide fuel and lubrication systems for diesel engine, complete with replacement element type air cleaner; primary and secondary fuel filter and oil filter; full pressure lubrication system with positive displacement lube oil pump and spring-loaded bypass valve; lube oil cooler; engine driven fuel transfer pump; base-mounted day tank, sight gauge, automatic float switch to maintain fuel level, and high-fuel and low-fuel alarm dry contacts for local and remote indication. Provide day tank rupture basin contacts (2 sets) for local and remote alarm.
5. Provide a cooling system with sufficient capacity for cooling engine when generator is delivering 100% full load for four hours at ambient of 40 degrees C at an altitude of 350 feet. Include water-circulating pump and thermostatic valve to maintain recommended engine temperature; radiator with drain and air vent and fan with protective guard; jacket water corrosion resistant heating elements (1 unit at 1800W 208V – Contractor

shall field re-wire as necessary for 208V1PH connection). Radiator shall be filled with antifreeze solution of strength as recommended by Manufacturer. Exhaust air shall be discharged vertically, using a scoop design.

6. The exhaust system shall consist of a silencer meeting the requirement of no more than 78 dBA at 7 meters from the exhaust point of the silencer (this does not take into account the run of the exhaust beyond normal exhaust locations). All areas within 24 inches of the silencer shall be covered with 6 lb. density mineral wool. All piping shall be schedule 40 black pipe.
 - a. The exhaust system, silencer, piping, and insulation shall be factory supplied and installed. Extend black standard weight iron pipe from the engine with 18" flexible connection between engine and muffler. The exhaust muffler shall be critical grade, of 3-chamber construction with high degree silencing materials and shall be unit installed. Unless otherwise noted on drawings, provide silencer mounting within housing, and tail pipe with rain cap.
 - b. The manufacturer is to verify that the back pressure of the exhaust piping in the conditions shown on the drawings does not exceed manufacturer's requirements.
7. Provide a unit-mounted battery for engine start, 24-volt DC with a capacity of not less than 160-ampere hours at 20-hour rate. The battery shall also be sized for six starts of 30-second cranking duration each, with ambient 15 degree F, mounted on earthquake-proof tray on pad with all necessary battery cables, hydrometer and enclosure-mounted voltage-regulated battery charger in Nema 3 enclosure with float, taper, and equalize charge settings and with DC voltmeter, DC ammeter and circuit for low voltage alarm. Battery shall be lead-acid type.
8. Auxiliary switches for over-speed trip and automatic over-speed shut down at a speed 10% greater than the normal specified operating RPM. The engine shall shut down on over-speed, low oil pressure, high oil temperature and high water temperature by means of auxiliary switches, actuating signal lights and alarms.
9. Temporary batteries may be used for testing, but new, unused batteries shall be furnished after final testing is complete and before acceptance. New batteries shall be used for one generator start to demonstrate adequacy of final battery installation.
10. Engine exhaust emissions shall meet the latest adapted EPA Tier Exhaust Emission Compliance Statement, the latest CARB requirements for emergency standby applications, and the local Air Quality Management District standards.

D. Generator:

1. 120/208-volt, 3-phase, 60 Hz., 4-wire rated at 0.8 power factor continuous standby service, complying with NEMA standards.
2. Brushless, balanced 4-pole revolving field type with rotating rectifier exciter mounted on end of shaft, single ball bearing support to starter housing, rotor connected by semi-flexible steel disc coupling to engine flywheel to assure permanent alignment free of injurious tensional vibrations at speeds up to 125% of synchronous. Rated for 105 degrees Centigrade rise.
3. Generator insulation shall be in accordance with latest NEMA standards using minimum Class H materials. All insulation system components shall meet NEMA MG1 temperature rise limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees centigrade.
4. A permanent magnet generator (PMG) shall provide excitation power for immunity to voltage distortion caused by non-linear loads. The PMG shall sustain excitation power for optimum motor starting and to sustain short circuit current at approximately 300% of rated current for not more than 10 seconds.
5. Voltage regulator of static solid state design to give (+/-) 2% regulation from no-load to full load; instantaneous voltage dip less than 20% of rated when full load at rated power factor suddenly applied; and recovery to stable operation of voltage within 1% of rated within four seconds. The voltage regulator shall be of the asynchronous pulse width modulated type and shall be insensitive to severe load-induced waveshape distortion from SCR or thyristor circuits such as those used in UPS and motor speed control

- equipment. Manual adjustment of (+/-) 5% of normal to be included by a lockable device or screwdriver slot in rheostat shaft. All voltage sensing shall be 3-phase.
- a. The automatic voltage regulator shall be temperature compensated, solid-state design. The voltage regulator shall control build up of AC generator voltage to provide a linear rise and limit overshoot. The regulator shall include a torque-matching characteristic, which shall use differential rate of frequency change compensation to use the maximum available engine torque and provide optimal transient load response. Regulators, which use a straight line fixed volts per hertz characteristic, are not acceptable.
6. Shielding of generator, exciter and regulator to prevent radio frequency interference.
 7. The generator, exciter, and voltage regulator shall be designed and manufactured by the engine-generator set manufacturer so that the characteristics shall be matched to the torque wave of the engine to provide the fastest possible system recovery from transient load changes and to prevent engine stall during transient overload conditions.
- E. Control Equipment:
1. Panel mounted with vibration isolators to plant frame. Top of panel shall not exceed 6'-0" above concrete pad.
 2. The generator set shall be provided with a microprocessor-based control system, which shall be designed, to provide automatic starting, monitoring and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set and remote monitoring and control as described in this Specification. The control panel shall be mounted on the generator set.
 3. The control panel shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.
 4. The control panel shall be UL508 labeled, CSA282-M1989 certified and meet IEC8528 part 4. All switches, lamps and meters shall be oil-tight and dust-tight and the enclosure door shall be gasket. There shall be no exposed points in the control panel (with the door open) that operate in excess of 50 volts. The controls shall meet or exceed the requirements of Mil-Std 461C part 9 and IEC Std 801.2, 801.3 and 801.5 for susceptibility, conducted and radiated electromagnetic emissions. The entire control shall be tested and meet the requirements of IEEE587 for voltage surge resistance.
 5. The generator set mounted control panel shall include the following features and functions:
 - a. Three position control switch labeled RUN/OFF/AUTO: In the RUN position the generator set shall automatically start and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage
 - b. Red "mushroom-head" push-button EMERGENCY STOP switch: Depressing the emergency stop switch shall cause the generator set to immediately shut down and be locked out from automatic restarting.
 - c. Push-button RESET switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
 - d. Push-button PANEL LAMP switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed or after the switch is depressed a second time.
 - e. Generator Set Metering: The generator set shall be provided with a metering set with the following features and functions:
 - f. 2.5-inch, 90-degree scale analog voltmeter, ammeter, frequency meter and kilowatt (KW) meter. These meters shall be provided with a phase select switch and an indicating lamp for upper and lower scale on the meters. Ammeter and KW meter scales shall be color coded in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red.

- 1) Digital metering set, 0.5% accuracy, RMS type to indicate generator voltage, frequency, output current, output KW, KW-hours and power factor. Generator output voltage shall be available in line-to-line neutral voltages and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
- g. Generator Set Alarm and Status Indication: The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel.
 - 1) Low oil pressure (alarm)
 - 2) Low oil pressure (shutdown)
 - 3) Oil pressure sender failure (alarm)
 - 4) Low engine temperature (alarm)
 - 5) High engine temperature (alarm)
 - 6) High engine temperature (shutdown)
 - 7) Engine temperature sender failure (alarm)
 - 8) Low coolant level (alarm or shutdown--selectable)
 - 9) Fail to crank (shutdown)
 - 10) Over-crank (shutdown)
 - 11) Over-speed (shutdown)
 - 12) Low DC voltage (alarm)
 - 13) High DC voltage (alarm)
 - 14) Weak battery (alarm)
 - 15) Low fuel-Base tank (alarm)
 - 16) High AC voltage (shutdown)
 - 17) Low AC voltage (shutdown)
 - 18) Under frequency (shutdown)
 - 19) Over current (warning)
 - 20) Over current (shutdown)
 - 21) Short circuit (shutdown)
 - 22) Ground fault (alarm)
 - 23) Under frequency (alarm)
- h. In addition, provisions shall be made for indication of two customer-specified alarm or shutdown conditions. The non-automatic indicating lamp shall be red and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.
- i. Engine Status Information: The following information shall be available from a digital status panel on the generator set control:
 - 1) Engine oil pressure (psi or kPA)
 - 2) Engine coolant temperature (degrees F or C; both left and right bank temperature shall be indicated on V-block engines)
 - 3) Engine oil temperature (degrees F or C)
 - 4) Engine speed (rpm)
 - 5) Number of hours of operation (hours)
 - 6) Number of start attempts
 - 7) Battery voltage (DC volts)
- j. The Generator Control Panel shall monitor the status of each Automatic Transfer Switch connected to the generator. The monitoring for the Automatic Transfer Switch shall be:
 - 1) ATS Normal Position
 - 2) ATS Emergency Position
- k. The ATS status shall also be displayed on the Generator Remote Annunciator.

6. Control Functions: The control system provided shall also include a cycle cranking system, which allows for user selected crank time, rest time and number of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each with 15-second rest periods between cranking periods.
 7. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode the alternator excitation system shall be disabled.
 8. The control system shall include an engine governor control which functions to provide steady state frequency regulation as noted elsewhere in this Specification. The governor control shall include adjustments for gain; damping and a ramping function to control engine speed and limit exhaust smoke while the unit is starting. The governor control shall be suitable for use in paralleling applications without component changes.
 9. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
 10. The control system shall include sender failure monitoring logic, which is capable of discriminating between failed senders or wiring components and an actual failure conditions.
- F. Remote Indicator Panel: Provide quantity one (1) remote annunciator panel. The panel shall be flush-mountable with micarta label reading "Engine Operator Conditions," and with the following devices:
1. Green pilot light with engraving to indicate "ENGINE RUNNING."
 2. One audible alarm with silencing switch to indicate engine start failure for any of the following reasons:
 - a. High water temperature.
 - b. Low oil pressure.
 - c. Over-speed.
 - d. Over-crank.
 - e. Low battery voltage.
 - f. Low-level fuel alarm.
 3. Remote indicator panel shall include an amber light indication for each of the following:
 - a. Control switch not in auto position.
 - b. Low water temperature.
 - c. ATS in normal position.
 - d. ATS in emergency position.
 4. Each of the functions listed previously in Paragraphs 2. (a) through (f) shall be indicated by a separate red warning light and each warning light shall be so engraved.
- G. Fuel System: The fuel system shall conform to NFPA 30 and 37. The fuel system shall be complete and shall consist of a dual filtering system, and engine fuel pump. The engine shall start, operate, and stop on DF-2 fuel.
1. Fuel Filtering System: The fuel filtering system shall consist of a strainer, located between the storage tank and the fuel transfer pump, and a duplex fuel filter, located between the engine fuel pump and the engine. The filtering system shall be capable of removing from the fuel system flakes, dirt, metallic chips, carbon, water, or other foreign matter, which would be harmful to the engine. The filtering system shall be easily accessible for quick-and-easy replacement of the filter element and cleaning of the strainer. Components of the filtering system shall be the standard products of the engine Manufacturer.
 2. Engine Fuel Pump: The engine fuel pump shall be a positive-displacement, engine-driven pump capable of supplying an adequate quantity of fuel to the engine under all operational conditions. Solenoid shut-off valve in fuel line discharge side of pump shall be interlocked with the emergency engine shutdown circuitry.
 3. Fuel Transfer Pump: The fuel transfer pump shall be a dual motor driven dual pump system mounted on or adjacent to the day tank for transfer for fuel from the separately-mounted tank to the day tank.

4. Fuel Tank: The fuel tank shall be a separately-mounted Supervault tank provided and installed under another Division of the Specifications.
 5. Day Tank: A 30-gallon day tank shall be provided with the engine-generator package, skid mounted under the engine, and shall be capable of providing an immediate fuel supply to the engine fuel pump. The tank shall be provided with a flexible tubing suction line to the engine, an excess fuel return line from the engine to the tank, a fuel gauge, a vent, a drainpipe, and high and low-level float switches for activating the low-level alarms. The tank shall be a full double wall, U.L. listed design and shall be factory tested in accordance with the requirements of U.L. 142. The outer containment cavity shall be equipped with an emergency leak-detection float switch for the leak detection and alarm system.
 6. The tank shall include labels to indicate "Diesel Fuel". The lettering shall be 3" high, half-inch stroke, red letters on a white background outlined in red.
 7. All of the above items shall be submitted for approval. Do not release the fuel tank for manufacture until it has been approved.
- H. Output Circuit Breaker:
1. Provide engine-generator mounted circuit breaker, rating as noted on the Drawings.
 2. Breaker handle shall not exceed 6'-6" above grade when engine-generator is mounted to a 6 inch high structural isolation pad.
- I. Protective Sound Attenuated Enclosure:
1. The generator set and accessories shall be completely housed in a weather protective and sound attenuated enclosure. The enclosure shall have a cambered roof to prevent rain accumulation, shall include stainless steel hardware to prohibit rust, and shall include stainless steel retainers to hold doors securely in place. The enclosure sound level shall be 70dBA at 23 feet. The generator set, enclosure, and sub-base day tank shall be U.L 2200 listed as a package
 2. Material used for the enclosure shall 14 gauge steel for panels and 12 gauge steel for posts. Hinged lockable access doors shall be provided on each side, with hold-open retainers as indicated in Paragraph 1 above. Non-hygroscopic sound insulating materials shall be provided on the interior walls. Rodent barriers shall be provided on inlet and outlet sides. Louvers shall be fixed. The enclosure shall include the sub-base day tank. Oil and coolant drains shall be run to the exterior of the enclosure. Interior valves on the oil and coolant lines shall be provided for ease of service.
 3. Unless otherwise shown on drawings, the enclosure shall completely house the muffler on the generator set.
 4. Provide sheet metal scoop on radiator output, to direct the radiator exhaust air directly up and vertically out of the generator enclosure. Insure that scoop provides adequate airflow under the conditions at the location of the generator. Provide screen on output of scoop to prevent dirt, leaves, and bird incursions. Provide drain on floor of scoop to drain off any water. Provide access door in scoop for cleaning of any accumulated debris. Scoop shall be factory-mounted as part of the engine-generator package. Provide detailed shop drawings of scoop with engine-generator submittals.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The engine-generator set shall be mounted on a rigid steel chassis suitable for installation on seismic isolators.
- B. Coordinate delivery schedule and location with the Owner.
- C. The Contractor shall assist the Owner in preparing and submitting a permit-to-construct application to the local Air Quality Management District for installation of the engine-generator. Granting of such permit will require a site-specific screening application followed by an analysis by the local Air Quality Management District. If the local Air Quality Management District analysis concludes that a diesel particulate filtering (DPF) system will be required for this site, the Manufacturer shall provide to the Owner a proposal for any and all modifications to the engine-generator unit that will be required to meet the local Air Quality

Management District requirements. If a DPF is required, it shall be certified and labeled as IBC compliant for critical equipment, and shall be included in one overall housing with the other engine-generator components. The Manufacturer shall include with its proposal IBC re-certification of the overall assembly by analysis to include the DPF. Proposal shall include delivery and costs for all modifications.

- D. Load tests shall be run as required in Paragraph 1.4 of this Section to the generator rated load after generator installation is complete. The Manufacturer for full-load testing of the generator shall provide auxiliary load banks. Manufacturer shall schedule the tests with the Owner so that final tests may be witnessed. Verify correct reading and operation of all meters, indicators and controls.
- E. Readings required during both preliminary and final tests requested in Paragraph 1.4 shall be taken and shall include the following:
 - 1. Frequency.
 - 2. Voltage.
 - 3. Current.
 - 4. Wattage.
 - 5. Ambient temperature.
 - 6. Water temperature.
 - 7. Oil pressure and temperature.
- F. Protection: Provide protection facilities and procedures to prevent damage and deterioration.
- G. Verify utility phase rotation prior to connection of the Generator to the Building Distribution System. Modify the Generator output phase rotation to match the Utility Company.
- H. The Manufacturer shall perform all required testing of the fuel day tank at the site after the installation is complete, but before the fuel is delivered. Tests shall include verification of correct operation of the leak detection system.

3.2 INSTRUCTION AND MAINTENANCE

- A. Instruct the Owner's personnel in the proper use, operation and maintenance of the set. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in the procedures to be followed, checking for the source of an operational failure or malfunction.
- B. Maintenance Period: Starting at the date of acceptance of the Work, provide complete systematic inspection and maintenance for the first three years. Furnish trained experts and equipment to check, adjust, lubricate and otherwise maintain the generator set in operation without defects or deterioration. Replace or repair materials and parts, which become defective or deteriorated for any reason.
- C. Furnish a factory-trained Engineer for a minimum of one working day prior to final acceptance of the generator installation, or as needed to satisfy Owner that the system is functioning properly. Testing and training for the new engine-generator installation will take place at non-standard times. Training and testing will take place on weekends, and could be scheduled on holidays and in the middle of the night, at the discretion of the Owner. Provisions shall be made in the bidding for this contract for such scheduling requirements.
- D. Provide 5 year Manufacturer maintenance Contract, for the new engine-generator installation. The maintenance contract shall be a comprehensive contract to include Parts, Labor, and Travel. The maintenance contract shall also include two site visits per year and annual portable load-bank testing as specified in Paragraph 1.1 of this Section.

* * *

AUTOMATIC TRANSFER SWITCH

Section 26 36 23

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide automatic transfer switch (ATS) as indicated on the Drawings and as specified herein.
- B. For CBC compliance, the ATS shall be considered critical equipment with an importance factor of 1.5. Provide Special Seismic Certification documentation as per CBC and ASCE/SEI requirements for all equipment defined as 'critical' with an importance factor of 1.5, as per Paragraph 1.10 of Section 26 05 00 – Basic Electrical Requirements.
- C. The Manufacturer shall provide certification by an approved agency that the ATS, including all components, enclosure, mounting, and attachment is CBC compliant.
- D. Seismic installation of ATS: Based on Manufacturer's approved submittal, Contractor shall retain the services of a State of California registered Structural Engineer to prepare final installation details and drawings for equipment supports and attachments.

1.2 SUBMITTALS

- A. Refer to Section 26 05 00 – Basic Electrical Requirements for procedure.
- B. Shop Drawings and Product Data, including complete wiring diagrams, including system interconnections.
- C. Test and Test Report for the Automatic Transfer Switch:
 1. Visual and Mechanical Inspection:
 - a. Inspect for physical damage.
 - b. Compare equipment nameplate information and connections with single line diagram and report any discrepancies.
 - c. Check switch to ensure positive interlock between normal and alternate sources.
 - d. Check tightness of all cable connections and bus joints.
 - e. Perform manual transfer operations.
 2. Electrical Tests for each Automatic Transfer Switch:
 - a. Perform insulation resistance tests phase-to-phase and phase-to-ground with switch in both source positions.
 - b. Set and calibrate in accordance with the Manufacturer's recommendations.
 - (1) Voltage-sensing relays.
 - (2) Transfer time delay relays.
 - (3) Engine shutdown relays.
 - c. Perform automatic transfer by:
 - (1) Simulating loss of normal power.
 - (2) Return to normal power.
 - d. Monitor and verify correct operation and timing:
 - (1) Normal voltage-sensing relays.
 - (2) Engine start sequence.
 - (3) Time delay upon transfer.
 - (4) Alternate voltage-sensing relays.
 - (5) Automatic transfer operation.
 - (6) Interlocks and limit switch function.
 - (7) Timing delay and retransfer upon normal power restoration.
 - (8) Engine shutdown feature.
 - (9) Correct functioning of auto-exercising controller.
 - D. Maintenance and operating instruction manuals. Submit five bound copies including approved Shop Drawings, parts list, list of recommended spare parts, sources of purchase and similar information.
 - E. CBC Seismic Certificate of Compliance.

1.3 REFERENCE STANDARDS

- A. The following Specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this Specification to extend the indicated by the

references thereto. Except where specific date is given, issue in effect (including amendments, addenda, revisions, supplements, and errata) on the bid date shall be applicable. In text such Specifications and standards are referred to by basic designation only.

- B. National Fire Protection Association (NFPA)
No. 70 National Electrical Code (NEC)
- C. Underwriters' Laboratories, Inc. (UL):
No. 1008 Automatic Transfer Switches
No. 489 Molded Case Circuit Breakers
- D. National Electrical Manufacturers Association (NEMA):
ICS 2.447 Industrial Control and Systems
- E. American National Standards Institute (ANSI):
V37-90a Guide for Surge Withstand Capability (SWC) Tests

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Onan
ASCO
Russelectric
Zenith
Kohler

2.2 AUTOMATIC TRANSFER SWITCH, GENERAL

- A. The ATS shall be rated as noted on the Drawings, four pole configuration. Complete transfer switch shall be listed and labeled under UL-1008 as a device for use on emergency generator systems. ATS shall be mounted in a Nema 1 enclosure. ATS shall be the standard product of a company engaged in manufacturing automatic transfer switches for at least 10 years. ATS shall be manufactured so that no rear or side access is required.

2.3 CONSTRUCTION AND PERFORMANCE

- A. Transfer Switch shall consist of a completely enclosed with a separate control logic panel. The contact assemblies shall be operated by a stored energy mechanism, and be energized only momentarily during transfer providing inherently double throw switching action. Control power for all transfer operations shall be derived from the line side of the source to which the load is being transferred.
- B. Transfer Switch shall be positively interlocked mechanically and electrically to prevent simultaneous closing of both sources under either automatic or manual operation. A neutral position shall not be possible under normal electrical operation except that the switch shall be provided with a Delayed Transition accessory for switching highly inductive loads. Transfer Switch shall have a manual neutral position for load circuit maintenance. A Transfer Switch position indicator shall be visible from the front of the switch to show to which source the transfer switch is connected.
- C. Transfer switch shall be capable of being operated manually under full load conditions. Manual operation shall be accomplished via integrally mounted pushbutton operators located on the face of the contact assemblies. Removable manual operation handles and handles which will move in the event the electrical operator becomes energized while performing a manual transfer operation are not acceptable. The manual operator shall provide the same contact-to-contact transfer time as provided under normal automatic operation to prevent possible flashovers from switching the main contacts slowly. In addition, provisions shall be provided to allow disengagement of the electrical operator during manual operation.
- D. A solid state sensing and control logic panel shall be separately mounted from the power-switching portion of the Transfer Switch. The two Sections shall be connected together by control cables with plug-in connectors. The control Section shall be capable of being disconnected from the power Section for maintenance purposes.
- E. The logic circuit shall utilize differential sensing solid-state components mounted on printed circuit boards to accomplish proper operation and to perform functions such as timing and voltage and frequency monitoring. LED's on each PC card shall indicate the proper operation

of each function furnished. Construction shall be such that functions cards are individually replaceable without requiring replacement of the complete solid-state package. Cars for plug-in modifications shall be available for field installation with retention of the UL label.

2.4 SEQUENCE OF OPERATION

- A. Upon reduction of phase-to-phase voltage of the normal source to 80% of nominal, and after a time delay of 1-90 seconds (adjustable to meet field conditions) to override momentary dips and/or outages, the auxiliary engine start contacts shall close to initiate starting of the Emergency Generator.
- B. After the Generator has reached 90% of nominal voltage and frequency, and after a time delay (see Drawings for the Time Delay Setting for each ATS), the ATS shall transfer the load to the Generator. Provide an under-voltage / under-frequency monitor for the Emergency/Standby Source.
- C. When the Normal Source has been restored to 90% of rated voltage, and after a time delay adjustable from 0.5-30 minutes (to insure the integrity of the Normal Power Source), the load shall be retransferred to the Normal Source. Refer to the Drawings for the Time Delay Setting for each ATS.
- D. A time delay module shall be provided in ATS, adjustable 0.5-30 minutes, to delay shutdown of the Emergency/Standby Power Source after retransfers to allow the generator to run unloaded for cool-down.
- E. If the Emergency Generator should fail while carrying the load, transfer to the Normal Power supply shall be made instantaneously upon restoration of the Normal Source to satisfactory conditions.
- F. ATS shall be provided with a Delayed Transition timer, adjustable 0-120 seconds. The ATS shall pause during transfer with both sources disconnected from the load, to allow back-EMF from large inductive loads to decay. Methods, which use relative phase-angle differences to control transfer, are not acceptable.
- G. ATS shall be provided with 4 sets of Auxiliary Contacts to indicate 'Normal' or 'Emergency' Position of the ATS.

2.5 ADDITIONAL ACCESSORIES/SPARE PARTS

- A. Provide an engine exercise timer in the Automatic Transfer Switch, which shall automatically start the engine periodically. Timer shall be digital, with lithium battery back up. Provide a selector switch to select exercise with load transfer or without load transfer. The timer shall include a failsafe circuit, such that if the engine fails during exercise the ATS will immediately retransfer to the Normal source.
- B. Provide pilot lights to indicate to which source the load is connected, and to indicate the availability of each power source.
- C. The transfer switch shall be rated for the short circuit currents noted on the Drawings, or a minimum of 65,000AIC, to be verified as part of the short-circuit study see Section 26 24 00.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Section 26 05 00 – Basic Electrical Requirements for details of Work under this Section, including seismic installation requirements.
- B. Testing: See Sections 26 32 00 – Standby Emergency Electric Generator and 26 08 00 - Testing.

* * *

TRANSIENT VOLTAGE SURGE SUPPRESSOR (TVSS)

Section 26 43 00

PART 1- GENERAL

1.1 WORK INCLUDED

- A. The Basic Electrical Requirements, Section 26 05 00 – Basic Electrical Requirements, are part of this Section, and the contract for this work, and apply to this Section as fully as if repeated herein.
- B. This specification describes the mechanical and electrical requirements for a transient voltage surge suppressor and noise filter herein known and shown on all drawings as TVSS. The TVSS shall be suitable for application in category C3, B3/C1, and B3 environments (see Part 2 of this Section for specific application) as described in ANSI/IEEE C62.41. The TVSS shall be of parallel design and provide surge protection in all modes as well as electrical high frequency noise filtering for high exposure locations as defined in ANSI/IEEE C62.41-1991.
- C. The unit shall be UL 1449 Listed as a Transient Voltage Surge Suppressor and UL 1283 Listed as an Electromagnetic Interference Filter.

1.2 SUBMITTALS

- A. Comply with the general contract requirements.
- B. Submit all related TVSS specifications, electrical and mechanical drawings, maintenance manuals and U.L. 1449 surge suppression ratings for the TVSS.
- C. Equipment Manual: Furnish with the submittal and with each unit delivered an equipment manual (3 copies) that details the installation, operation and maintenance instructions for the specified unit.
- D. Drawings: Electrical and mechanical drawings (3 copies) shall be provided with the submittal and with each unit delivered that show unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.
- E. UL 1449 Listing/Clamp Voltages: Manufacturer shall provide data showing UL 1449 product listing. Manufacturer shall also submit certified documentation of applicable Location Category Testing in full compliance with Nema LS 1-1992, paragraphs 2.2.10 and 3.10.
- F. Single Pulse Surge Current Capacity Testing: Certified documentation of the unit's Single Pulse Surge Current Capacity Testing shall be included in the submittal.
- G. Minimum Repetitive Surge Current Capacity Testing: Certified documentation of the unit's Minimum Repetitive Surge Current Capacity Testing shall be included in the submittal.
- H. Spare Parts: A list of customer-replaceable spare parts shall be included in the submittal and with each unit delivered. All spare parts shall be quickly and easily field-replaceable.
- I. Diagnostic Signature Card: Each TVSS unit shall include a Diagnostic Signature Card listing factory-established benchmark suppression voltage values for all modes of protection. The suppression voltage values shall be established during final production line testing utilizing a DTS-2 Diagnostic Test Set. This Diagnostic Signature Card shall provide space for subsequent field-testing allowing comparison of the initial factory benchmark testing with subsequent field-testing suppression voltage values.

1.3 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Firms regularly engaged in the manufacture of TVSS products for categories C3, B3/C1, and B3 (ANSI/IEEE C62.41) and whose products have been in satisfactory service for not less than 5 years.

1.4 CODES AND STANDARDS

- A. UL compliance and labeling: Listed per UL 1449 and UL 1283.
- B. ANSI/IEEE compliance: Comply with ANSI/IEEE C62.41 (Categories C3, B3/C1 and B3 as applicable - see Part 2 of this Section) and C62.45.
- C. NEC compliance: Comply with NEC as applicable to construction and Article 280 for installation.
- D. National Electrical Manufacturers Association (NEMA LS1-1992)
- E. The TVSS shall be capable of surviving 1000 sequential Category C3, B3/C1, or B3 surges (as applicable - see Part 2 of this Section) without failure. Follow IEEE test procedures established in C62.45.

PART 2 -PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. List of Equipment Manufacturers:
Transient Voltage Surge Suppression
 Current Technology
 Liebert
 L.E.A. Dynatech
- B. Surge Suppressor shall be Current Technology or approved equal with options as listed in paragraph 2.02-L below:
 - 1. Switchboards, Distribution Panels and other distribution equipment rated 800A or less with no upstream TVSS protection (Category B3/C1):
 - a. 200,000A Single Surge Current Capacity (L-N / L-G / N-G / L-L)
 - b. Type TG200-120/208V-3GY-DM-L2 for 120/208V systems.
 - 2. Switchboards, Distribution Panels and other distribution equipment rated 800A or less with upstream TVSS protection (Category B3):
 - a. 150,000A Single Surge Current Capacity (L-N / L-G / N-G / L-L)
 - b. Type TG150-120/208-3GY-DM-L1 for 120/208V systems.
 - 3. Branch Circuit Panelboards with up-stream TVSS protection (Category B3):
 - a. 80,000A Single Surge Current Capacity (L-N / L-G / N-G / L-L)
 - b. Type TG80-120/208V-3GY-DM-L1 for 120/208V systems.
 - 4. Branch Circuit Panelboards with integral TVSS protection (Category B3):
 - a. 80,000A Single Surge Current Capacity (L-N / L-G / N-G / L-L)
 - b. Type EGPE2-80-120/208V-3GY WYE for 120/208V systems

2.2 TVSS GENERAL

- A. The TVSS maximum continuous operating voltage (MCOV) shall be capable of sustaining 115% of the nominal rms voltage continuously without degradation. All suppression filter systems maximum continuous operating voltages shall be in compliance with test and evaluation procedures outlined in NEMA LS 1-1992.
- B. Operating frequency range shall be 47 to 63 Hertz.
- C. Protection Modes. All protected modes shall be as defined per NEMA LS 1-1992, paragraph 2.2.7. TVSS shall provide protection in all modes, including Line-to-Neutral, Line-to-Ground, Line-to-Line and Neutral-to-Ground protection.
- D. The rated single pulse surge current capacity for each mode of protection of the unit shall be as indicated in Paragraph 2.01.B of this Section.
- E. In compliance with NEMA LS 1-1992, suppression filter systems shall be single pulse surge current tested in all modes at surge currents up to 150% of the product design rating by an industry-recognized independent test laboratory. The test shall include an ANSI/IEEE C62.41-1991 Category C1 surge defined as a 1.2 X 50 sec, 6000V open circuit voltage waveform and an 8 X 20 sec, 3000A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current magnitude with an approximated 8 X 20 sec waveform. To complete the test, another Category C1 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage measured from the two category C1 surges does not vary by more than 10%. Test results shall be submitted.
- F. Per ANSI/IEEE C62.41 and ANSI/IEEE C62.45-1992, all suppression filter systems shall be repetitive surge current capacity tested in every mode utilizing a 1.2 x 50 sec, 20 KV open circuit voltage, 8 x 20 sec, 10 KA short circuit current Category C3 bi-wave at one minute intervals without suffering either performance degradation or more than 10% deviation of clamping voltage at a specified surge current. Test results shall be submitted.
- G. Suppression filter systems EMI-RFI noise rejection or attenuation values shall be in compliance with test and evaluation procedures outlined in NEMA LS-1-1992.

Attenuation Frequency	100KHz	1MHz	10MHz	100MHz
Insertion loss (ratio)	50-1	350-1	500-1	250-1
Insertion loss (dB)	34	51	54	48

H. TVSS systems clamping voltages shall be in compliance with test and evaluation procedures outlined in NEMA LS 1-1992. Maximum clamping voltages shall be as follows:

System Voltage	Mode	A3 Ringwave	B3 Ringwave	B3/C1 Wave	Comb.	C3 Wave	Comb.
120/240	L-N	250	305	410		775	
120/208	L-G	355	420	410		775	
	N-G	220	290	380		550	
	L-L	440	540	750		1400	

- I. The unit shall be installed with coordinated UL 489 or UL 198 listed or recognized overcurrent protection devices.
- J. The TVSS shall have a response time no greater than .5 nanoseconds, for any of the individual protection modes.
- K. The TVSS shall use LED indicators, which provide indication of suppression failure as well as optically isolated N.C dry contacts for remote monitoring.
- L. TVSS Product Characteristics:
 - 1. TVSS Units for connections to equipment rated 1600A and above: The TVSS shall include an engineered solid-state high performance suppression system utilizing a predetermined number of selenium cells and arrays of non-linear voltage dependent metal oxide varistors with similar operating characteristics. The suppression system shall not utilize gas tubes, spark gaps, and silicon avalanche diodes. The suppression system shall not incorporate non-field replaceable components, which may degrade performance or long-term reliability of the suppression system.
 - 2. TVSS Units for connections to switchboards and panels rated 1200A and below: The TVSS shall include an engineered solid-state high performance suppression system utilizing arrays of non-linear voltage dependent metal oxide varistors. The suppression system shall not utilize gas tubes, spark gaps, and silicon avalanche diodes. The suppression system shall not incorporate non-field replaceable components, which may degrade performance or long-term reliability of the suppression system.
 - 3. Each TVSS shall include a high frequency extended range power filter and shall be UL 1283 listed as an Electromagnetic Interference Filter. The filter shall reduce fast rise-time, high frequency, error-producing transients and electrical line noise to harmless levels, thus eliminating disturbances, which may lead to electronic system upset. The filter shall provide minimum noise attenuation values as specified in Paragraph 2.02.G of this Section.
 - 4. All internal wiring associated with the suppression filter system and subject to surge currents shall utilize low-impedance copper bus bar. All internal connections associated with the suppression filter system and subject to surge currents shall be made with compression or mechanical solderless-type lugs and shall be bolted to the bus bars in order to reduce overall system impedance. No plug-in component modules, quick-disconnect terminals, non-field replaceable fusing or printed circuit boards shall be used in surge current-carrying paths.
 - 5. The unit shall include long-life, solid state, externally visible status indicators that monitor the on-line status of each phase of the unit.
 - 6. The unit shall incorporate an integral test point allowing easy off-line diagnostic testing verifying the operational integrity of the unit's suppression filter system. Field-testing shall permit proactive testing to ensure performance and long-term reliability. Testing shall include injection of an impulse into the off-line suppression filter system to verify the suppression performance values established at final factory testing and recorded

available which inform the user of failure after the fact do not meet the intent of this specification.

7. The TVSS shall include an integral non-fused safety interlocked disconnect switch with an externally mounted manual operator.
8. The TVSS shall include a battery-powered audible alarm that detects and provides notification of any single or multiple phase failure of the suppression filter system. The unit shall also include a status indicator for each phase that extinguishes to indicate a failure mode and an LED that flashes to indicate any alarm condition. The alarm shall have a silence switch and a test switch for ensuring positive function and shall have an alarm disable LED that illuminates when the alarm is disabled. The monitoring unit shall have an easily replaceable, commonly available battery for backup to ensure audible alarm function in the event of a total power failure. The unit shall have a battery backup monitor light, which shall illuminate when the battery requires replacement. To monitor on-line status, the monitoring package shall also include two sets of form C dry contacts (N.O. or N.C.) to facilitate connection to remote monitoring facilities. The contacts shall be normally open or normally closed and shall change state upon the failure of the suppression system or power loss in any combination of all three phases.

PART 3 - EXECUTION

3.1 GENERAL

- A. Refer to Section 26 05 00 – Basic Electrical Requirements for details of work under this section.

3.2 TESTING

- A. Upon completion of installation, a factory-certified local service technician shall provide testing services. The following tests shall be performed:
 1. Voltage measurements from Line-to-Ground, Line-to-Neutral, Line-to-Line and Neutral-to-Ground at the time of the testing procedure.
 2. Impulse injection to verify the system suppression voltage tolerances for all suppression paths. Impulse testing shall be completed while the unit is off-line to isolate the unit from the distribution system.
- B. Test results shall be recorded and compared to factory benchmark test parameters supplied with each individual unit. A copy of the start-up test results and the factory benchmark testing results shall be supplied to the engineer and the owner for confirmation of proper suppression filter system function. In addition, the integrity of the neutral-ground bond shall be verified through testing and visual inspection.

3.3 GUARANTEE

- A. The manufacturer shall provide a 5-year warranty from date of installation against failure of each TVSS unit.

* * *

LIGHTING

Section 26 51 01

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Light fixtures. Refer to the Lighting Fixture Schedule, and provide a complete and working Building Lighting System. Catalog numbers in the fixture schedule are basic fixture types.
 - 1. Additional features, accessories and options herein specified, described, scheduled, or as required by conditions in the field, are to be included for all fixtures provided.
 - 2. Provide 'Unistrut' channel mounting armatures and stainless steel aircraft cable suspension kits for all suspended linear fluorescent continuous-row luminaire assemblies in the Apparatus Bays, as detailed on the Drawings.
- B. Lamps. Provide all lamps for all fixtures of size and type as recommended by the fixture manufacturer and as scheduled, or specified herein.
- C. Ballasts, including standard and dimmed fluorescent, H.I.D., and solid-state drivers for L.E.D.'s.
- D. Lighting controls, including small packaged microprocessor-based programmable multi-scene wallbox-type dimmers, line voltage wall switches, motion sensors, automatic contactor-based systems tied to incoming Station Alerts, contactor-based 'scene' control via remote wall switches, and automatic Daylight Dimming Systems at selected areas.
- E. Exit and Emergency Egress lighting where indicated and where required by Code, including L.E.D. Exit Sign luminaires with integral battery backup, and egress pathway lighting supplied by normally-switched building luminaires connected to the Building Emergency Electrical Distribution System on generator backup, augmented by concealed 'pop-out' adjustable low voltage incandescent egress pathway luminaires with integral back-up batteries, at selected locations.
- F. Supports for outlet boxes and fixtures, including seismic restraint slack wires for recessed fixtures in suspended ceilings per code and backing in walls as required keeping fixtures secure and level.
- G. All required standard and non-standard mounting hardware for luminaires, including support brackets, bars, backing plates and blocking in ceilings and walls; Contractor shall order recessed fixtures with special, extra-deep trim collars where ceiling/soffit material depths warrant them.
- H. Special suspended and cantilever arm supported mounting armatures for long linear fluorescent luminaire runs at Apparatus Bay and Basement Parking Garage Entry Drive areas, fabricated from 'Unistrut' Channel assemblies, as detailed on the Drawings.
- I. Provide CBC 2010 compliant seismic installation of all equipment and fixtures as per Paragraph 1.10 of Section 26 05 00 – Basic Electrical Requirements.
- J. All lighting must be accessible for maintenance or repair by 8 foot ladder in interior of facility, except in Apparatus Bay areas and open Stairs and Stairwells.

1.2 INCORPORATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Section 26 05 00 – Basic Electrical Requirements and 26 27 00 – Basic Electrical Materials and Methods apply to all work in this section.
- C. Painting Finishes Division: Painting and Finishes (cutting of holes in finished surfaces for recessed lighting fixtures), painting of surface custom luminaire mounting brackets, Unistrut mounting channels, and miscellaneous exposed raceways, outlet boxes, luminaire mounting and/or connection hardware, etc., to match adjacent surfaces, as directed by the Architect.

1.3 RELATED WORK

- A. Ceiling Access panels where required for access to equipment, outlets, back-up batteries, remote ballasts, L.E.D. power supplies and transformers, etc., located above suspended ceilings, sheet rock or plaster ceilings. Coordinate with the Architect and other trades.

1.4 SUBMITTALS

- A. Submit under provisions of Section 26 05 00 – Basic Electrical Requirements.
- B. The Contractor shall furnish (6) six sets of submittals for review by the project team unless otherwise noted in these specifications. The submittals shall include the following information:
 - 1. Product Index: The following information shall be included in the product index

- a. Fixture Type. The index shall call out each luminaire type per the fixture schedule in the Contract Documents.
 - b. Manufacturer's Catalog Number. Outstanding information required to make a complete catalog number shall be clearly identified in the index.
 - c. Where a pole is included with the luminaire, include the catalog number of the pole in addition to that of the luminaire.
 - d. Lamp Data. Provide the Manufacturer's name and Catalog Number for each lamp including wattage, color temperature, and color rendering index.
 - e. Comments. The index shall include a column for comments. The comments column shall include extraneous information required for clarity.
2. Manufacturer's literature for every fixture listed on the Fixture Schedule.
- a. Catalog Information:
 - (1). Luminaire Data Sheet: The manufacturer's cut sheet shall include the following:
 - (a). Photometric: Candlepower distribution curve or table with horizontal readings at 0, 22.5, 45, and 90 degrees and vertical readings from 0 to 180 degrees in 5 degree increments in accordance with the Illuminating Engineering Society published test procedures.
 - (b). Catalog Number Nomenclature
 - (c). Coefficient of Utilization Tables
 - (d). Luminaire Line Drawing
 - (e). Ballast (each type)
3. Data sheets for electronic ballasts. Indicate fixture types on applicable ballast data sheets.
4. Data sheets for wallbox controls and other products specified in this section.
5. Shop Drawings:
- a. Provide shop drawings of suspension details for fixtures recessed in, mounted on, or suspended from hung ceilings. Details shall clearly illustrate proposed methods for supporting fixtures independent of the suspended ceiling system.
 - b. Detailed, dimensioned, scaled shop drawings of all cove mounted fluorescent-luminaires containing the following information:
 - (1). Exact field measured length (clear inside dimension) of cove or pocket.
 - (2). Exact fixture length and arrangement of lamps, i.e., placement of lamps on the fixture channel.
 - c. Detailed, dimensioned, scaled shop drawings of suspended luminaires constructed with linear metal housings containing the following information.
 - (1). Support mechanism, including aircraft cable suspension kits, including decorative canopies.
 - (2). Trim details.
 - (3). Closure piece details.
 - (4). Pattern configurations.
 - d. Detailed, dimensioned, scaled shop drawings of Contractor-provided special 'Unistrut' channel mounting armatures for long runs of linear fluorescent units arranged in continuous rows – both aircraft cable suspended and cantilever bracket-arm supported types called for on the Drawings, at the Apparatus Bay and Basement Parking Garage Entry Drive Areas, containing the following information.
 - (1). Support mechanisms, including stainless steel aircraft cable suspension assemblies.
 - (2). Custom-fabricated steel cantilever bracket arms.
 - (3). Connection provisions and hardware, including connection junction boxes, conduit, cords, etc.
 - (4). Dimensioned Plans for each individual luminaire run.
6. Samples:
- a. Provide samples of fixture trim where "Finish as selected by Architect" is indicated on the Fixture Schedule. Submit two finish samples, 75 mm x 75 mm (3" x 3") minimum, of all custom color; decorative metal, or anodized aluminum finishes. Samples must be approved in writing by the Architect prior to ordering.

7. Schedule of spare lamps.
 - a. Provide a schedule indicating the type and quantity of spare lamps to be provided to the Client at project closeout. Refer to Section 26 51 01, Article 3.5.G for specific lamp information.
 - C. For Any Fixtures Substituted For Those Specified:
 1. Independent Testing Laboratories, Inc., or equal, photometric test report for each Luminaire type and lamp combination listed on the Fixture Schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain polar coordinate candlepower distribution curves in five lateral planes for fixtures with asymmetric distributions and fixture luminance data for vertical angles above 45 degrees from nadir. Test results shall indicate fixture efficiency for the lamp and aperture assembly specified. Fixtures with efficiencies more than 2% below the values of specified fixtures are not acceptable and will be rejected.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver products to site and store in unopened cartons in protected location. Inspect products immediately and report all damage accordingly.
- 1.6 GUARANTEE AND WARRANTIES
- A. All work performed under this section must be guaranteed to be free of defects in products or workmanship for one year after date of acceptance by Owner, unless noted otherwise in General Conditions.
 - B. Warranties:
 1. Electronic ballasts must be warranted against failure for five years after date of substantial completion. Warranty includes replacement ballast and \$10.00 labor allowance.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide fixtures as indicated in Lighting Fixture Schedule; if conflict exists between Lighting Fixture Schedule and Specifications, the more stringent requirement shall take precedence.
- B. Provide lighting fixtures new and complete with mounting accessories, junction boxes, trims, and lamps.
- C. Provide products with UL labels appropriate to intended installation conditions, or with labels from other testing laboratories whose results are acceptable to local inspector, showing compliance with UL standards. Labels must be concealed from normal viewing angles.
- D. All products of same type by same manufacturer.

2.2 FIXTURE CONSTRUCTION

- A. Sheet metal: materials and thickness shall be 20-gauge (0.7 mm or 0.027") min., free of dents, scratches, oilcan, or other defects.
- B. Painted fixtures: exposed weld marks, joints, and seams shall be filled and sanded smooth before finishing.
- C. All edges cleaned and dressed to remove sharp edges or burrs.
- D. Extrusions: 1/10" min. wall thickness, smooth and free of tooling lines, with cast end plates that exactly match extrusion profiles.
- E. Castings: smooth, free of pits, scales, gate marks, or blemishes.
- F. Spinings shall have 1/32" min. thickness, smooth, free of spinning lines or blowback, with clean edges.
- G. Welds: Follow recommendations of American Welding Society. All welds continuous and free of spatter, residue, or warping.
- H. No light leaks visible in finished room. Ensure that downlight housings mounted in wood slat ceilings are not visible from below. Field paint exterior of housing with high temperature paint if necessary.
- I. Exposed end plates and joiners, with concealed fasteners.
- J. End-to-end mounted fixtures: Verify row configurations and provide joiners, aligning splines, and trims to suit.
- K. Hardware:
 1. Steel or aluminum interior fixtures: cadmium-plated hardware.
 2. Steel or aluminum exterior fixtures: stainless steel hardware.
 3. Stainless steel fixtures: stainless steel hardware.

4. Copper alloy fixtures: brass hardware.
- L. Raceways: Where used for through wiring, fixtures must be approved for use as raceways.
- 2.3 RECESSED FIXTURES
- A. Point-source fixtures: provide pre-wired junction box and thermal protection, and provide slack wires to structure at two diagonal corners. Order fixtures to be mounted in non-standard thickness ceilings and/or soffits with optional, extra-deep trims.
- B. Troffer fixtures: provide hold-down clip at each fixture corner, and slack wires to structure at two diagonal corners or as detailed on the drawings. The detail will take precedence.
- C. Verify ceiling construction details and provide fixture housings and trims to suit.
- D. Non-accessible ceilings: Provide access to junction boxes, ballasts, transformers, and battery packs through fixture apertures; no access panels in ceiling.
- E. Mounting frames: To prevent rusting, provide galvanized steel or cast aluminum frames for installation in damp locations or in plaster ceilings.
- F. Adjustable fixtures shall be provided with rotation and tilt locking devices.
- 2.4 PENDANTS
- A. Cable-suspended: 3/16"-diameter aircraft-grade stainless steel braided suspension cable with 1/4 x 20 chrome-plated stainless steel threaded coupler at top of linear fixtures, with fully adjustable stainless steel coupler, with knurled finish, at fixture housing(s), to permit min. 45-degree swing in any direction away from vertical. Flat canopy with drilled, grommet opening for power cord exit at power drop points, to permit splice inspection after installation.
- B. Stem-mounted: 16 mm (5/8") maximum o.d. stem with ball swivels at top (and bottom of linear fixtures) to permit 45° swing in any direction away from vertical. Flat canopy to permit splice inspection after installation.
1. Provide internal safety cable from fixture body to stud in outlet box.
- C. Supports: Carry fixture weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code. Refer to Fixture Mounting Details on Drawings.
- D. Provide and install decorative stainless steel aircraft cable 'ties', including chrome -plated or stainless steel hardware & fittings, to prevent sway of suspended fixtures wherever obstructions (ducts, pipes, walls, other fixtures, etc.) prevent free sway of 45 degrees in all directions. Refer to details on Plans, where shown.
- E. Pendants & suspension cables must permit +/- 13 mm (1/2") threaded vertical adjustment after installation, leaving at least 6 mm (1/4") thread contact at all points.
- F. Verify mounting heights for each fixture and coordinate stem/cable and feed lengths with manufacturer prior to ordering fixtures.
- 2.5 TRIMS
- A. Trims must fit tightly and be held in by gravity, spring clips, or mechanical fasteners. Trims must not drop out under normal conditions or seismic forces which do not exceed the design criteria of the building.
- B. Aluminum parabolic cones shall be smooth, properly shaped, with Alzak finish in colors as indicated.
1. No hot spots or lamp images visible at angles shallower than lamp shielding angle.
2. Self-flange cones must bend parallel to ceiling and cover ceiling hole without additional trim ring. Unpainted flange shall have the same finish as cone interior.
3. Cones and louvers for fluorescent fixtures must have permanent anti-iridescence treatment.
- C. Lenses, diffusers, and patterned glass: glass or virgin acrylic as noted, with patterns as noted.
1. Finished thickness 2 mm (1/10") min. unless noted otherwise.
2. Linear runs over 1200 mm (4'-0") long shall be in equal-length pieces.
3. Lenses for tungsten halogen fixtures shall be tempered borosilicate glass.
4. Lamp enclosures for metal halide lamps shall be glass or acrylic and must be capable of retaining lamp fragments in the event of non-passive lamp failure.
5. Glass UV filters for individual accent light fixtures, where indicated, shall be 3 mm (1/8") borosilicate glass filters with dichroic coating, 2% maximum light transmission @ 400nm, 80% min. transmission @ >425nm, Bausch & Lomb "Optivex" or equal by Balzers.

6. Acceptable Manufacturers:
 - a. Plastic lenses and diffusers: ALP, ICI/KSH & Haas.
 - b. Glass lenses and patterned glass: Balzers, Bausch & Lomb, Gray.

2.6 FINISHES

- A. Steel Reflectors: Unless otherwise specified, the reflector surface finish shall be of synthetic white enamel or polyester powder coating. Finish shall show no indication of chipping, cracking, flaking or any other sign of loss of adhesion. The initial reflection factor shall be not less than 88 percent averaging 5 randomly selected points on the reflector. After 100 hours of exposure to the radiation of a glass enclosed carbon arc lamp, such as a Fade-O-Meters, the reflectance of the exposed portion shall not be less than 5 percent and finish shall show no appreciable color change. The carbon arc lamp shall be operated at appreciable color change. The carbon arc lamp shall be operated at 13 plus or minus 0.5 amperes at 140 volts. The reflector shall be placed ten inches from the arc and the lamp so ventilated that the temperature of the exposed portion does not exceed 105 degrees F.
- B. Aluminum Reflectors: Reflecting surfaces shall be provided with either a specular or diffuse finish as indicated. Reflection factors shall be not less than 83 percent for specular reflecting surfaces. Each reflecting surface shall be protected by dense coating of oxide weighing not less than 5.0 milligrams per square inch, applied by an anodic process. The reflector shall be given a sealing treatment that will prevent staining of the reflecting surface when subjected to a stain test. All aluminum reflectors & louvers shall be a low iridescent equivalent to that provided by Coil Anodizers.
- C. Non-Reflecting Surfaces: Unless otherwise specified, the finish on all non-reflecting exterior surfaces shall be aluminum oxide or aluminum; white, gray or aluminum paint on steel; nickel or chromium plating on copper alloy. Fastening devices shall be nickel, chromium, cadmium or zinc plated. All painted surfaces shall be free of tears, star marks, blisters, pinholes, chipping and any other defects that may impair appearance or serviceability.

2.7 LAMPS

- A. Unless otherwise noted, lamps described in the Lighting Fixture Schedule and in these Specifications shall be manufactured by General Electric, Osram/Sylvania, North American Philips, Venture, or approved equal.
- B. Each type of lamp by only one manufacturer to maintain color consistency.
- C. Re-lamp fluorescent or HID fixtures at no cost to owner if lamps exhibit excessive lamp to lamp color variation or burn out within 90 days of substantial completion date.
- D. Fluorescent:
 1. Long fluorescent lamps shall either be 265ma full wattage, T8; 3000 deg. K color temperature; min. CRI 82; 4ft. lamps or, 170ma full wattage for standard output T5 lamps, and 460ma full wattage for high output T5 lamps, 3000 deg. K color temperature; min. CRI 85; 4ft lamps only. Provide TCLP compliant reduced mercury content lamps whenever such lamps are available.
 2. Compact fluorescent lamps shall be 3000 deg. K color temperature, min. CRI 82, and triple-tube as noted or as required for each fixture. Provide TCLP compliant reduced mercury content lamps whenever such lamps are available.
 3. Long compact fluorescent (Biax) lamps shall be 3000 deg. K color temperature, min. CRI 82, twin tube, single ended 4-pin. Provide TCLP compliant reduced mercury content lamps whenever such lamps are available.
 4. L.E.D. lamps shall be 3000 deg. K color temperature, min. CRI 80.
 5. "Burn-in" all fluorescent lamps on dimmed circuits for at least 100hrs. prior to dimming.
- E. High Intensity Discharge Lamps:
 1. High Intensity Discharge Lamps: clear, coated or diffuse, as noted, 3000 deg. K color temperature unless otherwise noted. HID lamps installed in open bottom downlight fixtures shall be self-extinguishing types wherein current to the arc tube is interrupted in the event that the lamp envelope is broken.
 2. Metal Halide:
 - a. Provide color corrected "Mastercolor" type lamps for all metal halide lamps less than 200 watts.

2.8 LAMP HOLDERS

- A. Incandescent and HID shall be porcelain, size to accommodate specified lamps.

- B. Fluorescent lampholders shall have plastic bodies with copper contacts. For horizontally mounted lamps over 8" long, provide additional plastic clip to support glass end of lamp.
 - 1. Provide rapid start lampholders in fixtures for all dimmed linear fluorescent lamps.
- C. High Intensity Discharge:
 - 1. Verify lamp mounting orientations and provide position-oriented lampholders where required to suit specified lamps.
 - 2. Low-wattage metal halide lampholders: rated for 6,000V starting pulse.
 - 3. Acceptable manufacturers: Bryant, Kulka, and Leviton.

2.9 BALLASTS AND TRANSFORMERS

- A. General:
 - 1. Verify input voltages and match to branch circuit voltages.
 - 2. Provide ballasts with best-made sound ratings for each type and mount securely to prevent vibration.
 - a. Replace excessively noisy ballasts or transformers at no cost to Owner.
 - 3. Remote ballasts or transformers: Provide suitable enclosures and mounting hardware, and install in accessible, ventilated locations.
 - a. Secondary wiring: provide number and size of conductors as required, with 3% maximum voltage drop between transformer and last lamp.
 - b. Keep ballasts or transformers at least 300 mm (12") apart and do not stack vertically.
 - 4. Ballasts must contain no PCB's and be labeled accordingly.
- B. Fluorescent Ballasts:
 - 1. Ballasts must meet applicable energy-conservation standards.
 - 2. Interwiring (for electronic ballasts):
 - a. In linear fixtures or continuous rows of individual fixtures, provide tandem wiring to operate each row of lamps independently. Provide three-lamp and four-lamp ballasts where possible, two-lamp ballasts only where needed to finish a row.
 - b. In individual one-lamp fixture, provide two-lamp ballasts and master-slave interwiring between pairs of fixtures where possible.
 - c. In individual two-lamp fixtures, provide two-lamp ballasts and interwiring between pairs of fixtures to operate one lamp in each fixture on each ballast.
 - d. In individual three-lamp or four-lamp fixtures, provide two-lamp ballasts and interwiring between pairs of fixtures to operate all outer lamps independently of all inner lamps.
 - e. In master/slave three-lamp or four-lamp fixtures, provide one, two-lamp ballast and one four-lamp ballast and master-slave interwiring between pairs of fixtures with and interwiring between pairs of fixtures to operate all outer lamps independently of all inner lamps.
 - 3. Electronic ballasts for long fluorescent lamps 97% min. power factor, "A" sound-rated, with UL Class P thermal protection, 85% min. ballast factor with specified types and numbers of lamps. Ballasts must operate specified lamps within lamp manufacturer's specifications and have no effect on rated lamp life when run more than 10 hours per start.
 - a. Instant-start operation, with starting voltage and filament current in compliance with ANSI C78-1.
 - b. Parallel-wired.
 - c. Provide interwiring and number of lamps per ballast as described under "Interwiring" above. Follow manufacturer's recommendations for maximum whip length.
 - d. Light variation 10% maximum with +/- 10% input voltage variation.
 - e. Electromagnetic radiation must not exceed FCC Part 18 regulations.
 - f. Surge and transient protection per IEEE 587, Category A and ANSI C62.1-1984.
 - g. End of life protection to guard against lamp delamination.
 - h. Harmonic distortion: Total harmonic distortion (ratio of total harmonic RMS current to fundamental RMS current) must be less than 20% or as required to meet local utility requirements, whichever is lower.
 - 4. Fluorescent Dimming Ballasts shall be Lutron Hi-Lume electronic type, providing 100% - 1% dimming range.

5. Preheat ballasts for short compact fluorescent lamps shall be electronic where noted, with 95% min. power factor; HPF ballast where electronic type are not specified and where HPF will fit fixture.
6. Acceptable Manufacturers:
 - a. Electronic: EBT, Universal Lighting Technologies, Osram/Sylvania, Advance, General Electric.
 - b. Electronic Dimming: Lutron, no substitutions.
 - c. Short compact fluorescent: Advance, Robertson, and Universal.
7. High Intensity Discharge (HID) Ballasts:
 - a. High power factor, thermally protected, constant-wattage autotransformer type, with fuses.
 - b. Ballasts for interior installation encased and potted.
 - c. Acceptable manufacturers: Advance, Jefferson, and Universal.

2.10 EMERGENCY LIGHTING AND EXIT SIGNS

- A. Emergency lighting: Provide lighting for paths of egress as required by code.
- B. Emergency fixtures supplied by a separate emergency power source.
 1. For fixtures supplied by a separate emergency power source, provide "switched" control of the emergency designated fixtures/lamps to allow complete "off" control when required by the user, and "dimming" control of the emergency designated fixtures/lamps to allow full-range automatic dimming controlled by Automatic Daylight Harvesting Control System as called for on the Plans and in the Specifications. The switched and/or dimmed control shall include an automatic transfer feature to automatically turn "on" to full intensity the emergency designated fixtures/lamps upon the normal source power failure.
 2. Automatic transfer function shall be provided using a UL 924 listed relay, LVS Inc. #EPC-U for switched loads and LVS Inc. #EPC-D-U for dimmed loads, or approved equal, suitable for mounting in a standard 4" square j-box (min. 2.5" deep). Transfer relay shall provide automatic diagnostic test feature which shall maintain power to the emergency designated lamps for 15 seconds after the room is switched off via the respective light switch or control relay. Emergency designated lamps shall turn off after the 15 second test period and shall come back on when the control device is turned back on to restore full lighting to the space.
 3. Provide (1) transfer module per "switched" zone; refer to Plans for mounting locations.
- C. Concealed Dedicated Emergency Units with Integral Battery Pack - provided in certain areas where standard architectural building luminaires cannot supply the minimum quantity of Code-required illumination.
 1. Retractable lamp armatures with two (2) MR16 lamps.
 2. Pure lead or nickel-cadmium, sealed and maintenance-free.
 3. Automatic transfer to battery power if supply voltage drops below 75% of normal.
 4. Must provide at least 87-1/2% or rated battery voltage for 90 minutes minimum.
 5. Internal circuitry to provide continuous "trickle" charge and to prevent deep discharge below 80% of rated battery voltage.
 6. Full recharge within 24 hours after restoration of normal power.
 7. Charge indicator light visible and test switch operable without tools.
 8. Concealed inside fixture.
- D. Exit signs shall be back-lit L.E.D., back mounted on walls, or with canopy for end wall or ceiling mounting, or wall and integral battery packs as described above. No atomic exit signs are permitted.
 1. Diecast aluminum housing with finish as specified on Lighting Fixture Schedule.
 2. Letters shall be 20mm (3/4") stroke, 150mm (6") high, with factory-screened left or right arrows as required, brightness and evenness of illumination per code, green color.
 3. Battery pack contained in fixture housing. No add-on packs or canopies for back-mounted units.
 4. Remote low-level exit signs, where required, shall be die-cast aluminum, 5/8" maximum thickness. Provide custom color finish to match adjacent wall.

2.11 SMALL PACKAGED PROGRAMMABLE DIMMERS

A. ACCEPTABLE MANUFACTURER: Lutron Electronics Co., Inc.

1. Unless otherwise noted, all basic components (Ballasts, Daylight Sensors, IR Receivers, IR Transmitters, Wall Controls and related accessories) shall be provided by one manufacturer.

B. MASTER CONTROL STATIONS:

1. Definitions: A "scene" or "preset" is a specific look or mood created by different lighting zones set at different intensities. A "zone" is either one or more lighting circuits which are controlled together as a group or one or more motor circuits which are controlled together as a group.
2. Control shall provide 4 preset lighting scenes and 'off' for up to 24 control zones. Control shall be capable of storing an additional 12 preset lighting scenes that can be accessed via wallstations and/or control interfaces. Up to 64 zones may be tied together in one system. Preset shall be set via easy-to-use raise/lower switches, one raise and lower switch per zone. The intensity for each zone shall be indicated via an illuminated barograph, one barograph per zone. More than one zone may be proportionately raised or lowered at the same time. Programming of preset scenes shall be accomplished without the use of an 'enter' or 'store' button. Additionally, one or more zones may be temporarily overridden without altering the scene values, which are stored in memory.
3. Lighting levels shall fade smoothly between scenes at time intervals of 0 to 59 seconds or 1 to 60 minutes. The fade time shall be separately selectable for each scene and shall be indicated by a digital display for the current scene. Pressing a scene select button shall illuminate the corresponding scene LED and simultaneously begin changing the barograph levels to reflect the currently selected scene. In the event that a preset scene with a fade time greater than 5 seconds is initially selected from an 'off' condition, the programmed fade time shall be temporarily overridden, unless otherwise noted, and the lights shall fade up to that scene over a five-second time span.
4. Controls shall incorporate built-in wide-angle infrared receiver, providing control via a separate wireless remote control transmitter from up to 50 feet away.
5. Control shall provide tamperproof protection of scenes using a minimum of four levels of electronic 'lockout' which prevent alterations of scene values stored in memory. Highest level of 'lockout' shall be capable of disabling manual control at the preset control unit.
6. Wallstations and control interfaces shall be capable of recalling preset lighting scenes, which shall be stored in preset control unit(s) and/or slider control(s).
7. Where indicated, control shall be capable of complete setup of all parameters locally, or when used with the appropriate programmer interface, via a compatible PC. Parameters shall include scenes (including both light levels in 1% increments and fade times), load types, low-end trim, tamperproof protection of scenes, and communication between control units (if applicable). Permanent installation of the PC shall not be required unless indicated on the drawings.
8. Mechanical
 - a. Faceplate shall attach using no visible means of attachment.
 - b. Controls shall be engraved with appropriate zone and/or scene descriptions, furnished to the manufacturer prior to fabrication. Size and style of engraving type shall be determined by the Architect. Any silk-screened borders, logos, graduations, etc., shall use a graphic process that chemically bonds the graphics to the metal faceplate, resisting removal by scratching, cleaning, etc.
 - c. Manufacturer shall ensure the following items regarding product color:
 - d. Product color matches NEMA standard WD1, Section 2, and the maximum color deviation from this standard shall not exceed $E=1$, CIE L^*a^*b color space units. For non-NEMA colors, color match coordination shall be provided on request.
 - e. Color variation of any control in the same product family shall not exceed $E=1$, CIE L^*a^*b color units.

- f. Visible parts shall exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674-89. Manufacturer to submit proof of testing upon request.
 - g. Dimmer shall mount individually in standard 2, 3, or 4 gang U.S.
9. Electrical
- a. Control shall provide power failure memory. Should power be interrupted and subsequently returned, the lights shall come back on to the same levels set prior to the power interruption without requiring any actions on the part of the user. Restoration to some other default level is not acceptable, unless specifically noted elsewhere.
 - b. Wiring from dimming and switching panel(s) to preset control unit(s) and wallstations and control interfaces shall be low voltage type Class 2 wiring (PELV).
 - c. Controls shall provide an immediate, local LED response upon button activation to indicate that a system command action has been requested. LED shall remain lit contingent upon receiving system confirmation of the successful completion of the command.
- C. REMOTE SCENE RECALL CONTROL STATIONS:
- 1. Entry Stations shall be installed in a standard 65 mm (2-1/2")-deep switch box. Stations shall be Lutron 'See-Touch' style with indicator light, finish to match other devices in room. When shown adjacent to other devices, install in same multi-gang box.
 - 2. Wallstation(s) shall mount individually in standard single gang U.S. wallboxes.
 - 3. Wallstation(s) shall have integrated IR receiver for DCS programming from the handheld programming device.
 - 4. Wallstation(s) shall provide an immediate local LED response upon button activation to indicate that a system command has been requested.
 - 5. Four button Wallstation(s) shall be capable of any of the following functions:
 - a. Recalling 4 separate Scenes and 'on' or 'off'
 - b. Fine-tuning of individual lighting groups
 - 6. Lighting groups shall be capable of over-lapping and operating an individual or multiple fixtures.

2.12 WALL-BOX DIMMERS

- A. Dimmers: Lutron Nova-T series, of size and type appropriate to loads, color finish as selected by Architect. Provide separate neutral conductor from panel to loads on each phase to prevent cross talk between phases.
- 1. Incandescent:
 - a. Rating as required by loads: NT-Series.
 - 2. Fluorescent: Provide dimmers and compatible Lutron Hi-Lume electronic dimming ballasts. Provide one neutral and two hot conductors between dimmer and load.
 - a. NTF-103P.
- B. Ganging and Labeling:
- 1. Dimmers and matching switches in same location shall be installed in same gang box.
 - 2. Follow dimmer manufacturer's instructions for gang-box sizes. Do not break off fins on dimmers unless noted otherwise.
 - a. 1+1, 4+1, 7+1 installation: to gang an even number of small devices without breaking off fins, provide multi-gang box as indicated (1, 4, or 7 gangs) and provide additional single-gang box at end, with ears of single box 70 mm (2-3/4") o.c. from last set of ears on multi-gang box.
 - b. When rows of devices are stacked vertically space rows 230 mm (9") o.c. to allow heat dissipation.
 - 3. Provide Lutron multi-gang plates to cover each group of devices; plates 3-gang and larger shall be custom-engraved to identify loads controlled.
 - 4. Plates with "-NFB" in catalog number with no fins broken.
 - 5. Plates with "-FB" in catalog number: break off all interior fins on devices, but do not break off outside fins at either end of row.
 - 6. Nova-T: install aligning backplate (provided by Lutron with each multi-gang plate) between wall and devices.

7. Labels: text as indicated 3 mm (1/8") high, all capital letters, engraved on device faceplate, filled with black paint and wiped clean.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Architectural Reflected Ceiling Plans shall govern exact location and mounting conditions for all fixtures. Subcontractor shall be responsible for coordination of fixture mounting and compatibility with ceiling construction and other trades.
- B. Coordinate work with other trades. Location of lighting has priority over location of new framing (except major structural members), ducts, diffusers, sprinklers, speakers, smoke detectors, and other obstructions.
- C. If obstructions are encountered which prevent installation of lighting fixtures according to drawings, notify Architect immediately and do not proceed until conflict has been resolved.
- D. Coordinate the location of fixtures in mechanical or unfinished spaces. Locations shown on Drawings may be adjusted by the Contractor to suit conditions only with approval by the Architect. Install fixtures to avoid obstructions and maximize light output, 2100 mm (7'-0") min. mounting height.
- E. Coordinate the location of any exposed conduit used to feed lighting fixtures with the Architect prior to installation.

3.2 INSTALLATION

A. General:

1. Subcontractor shall be responsible for handling and installation of fixtures including all supports, hangers and hardware necessary for a complete installation. Fixtures shall be clean, plumb, and level in straight lines, without distortion. Lighting fixtures must be installed so they do not shift during relamping or adjustment. Remedy any light leaks, which may develop after installation of recessed or enclosed fixtures.
2. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.
3. Point-source fixtures shall be located as dimensioned, or in center of tile or on tile joint as drawn; 6 mm (1/4") maximum off-center tolerance.
4. Linear fixtures shall have 3 mm (1/8") maximum horizontal or vertical alignment variation in any 5 m (16-ft.) portion of run.
5. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds. 486 A and B, and the National Electrical Code.
6. Clean lighting fixtures of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.
7. Remove and replace fixtures that may have been damaged during construction at no additional cost to the Owner.
8. Protect installed fixtures from damage during remainder of construction period.
9. Provide equipment-grounding connections for lighting fixtures as indicated. Tighten connections to comply with tightening torques specified in UL 486 A to assure permanent and effective grounds.
10. Install fixtures, lamps, lenses, etc., after building is enclosed, weather tight and environmental conditions are nominally the same as expected for the complete spaces.
... All lamps, glassware, reflectors and refractors shall be clean and free of chips, cracks and scratches.
11. Lamps installed for use as temporary lighting prior to approval shall be replaced with new lamps. Replace all burn outs with specified lamp prior to project closeout.
12. All wall mounted fixtures and all ceiling mounted surface fixtures including exit lights shall be fed through a fixture Stud/Hickey/Nipple assembly and with provisions to prevent fixture turning.
13. Installation of exit signs shall be coordinated with other trades to ensure signs are visible as intended.

14. All junction box cover plates for the lighting branch circuit system shall be clearly marked with a permanent ink felt pen identifying the branch circuit and control relay (panel number, circuit number, lighting control cabinet designation and control relay number) contained in the box.
- B. Recessed Fixtures:
1. Seismic restraints: Provide and install slack wires and hold-down clips per code.
 2. Holes for Recessed Point-Source Fixtures: Cut holes to follow fixture housings exactly so no gaps will be visible after trims are installed.
 3. Install bottom of housing aligned with finished ceiling.
 4. Keep ceiling insulation at least 75 mm (3") away from fixtures.
 5. Vertical-lamp compact fluorescent downlights shall be installed with adjustable lampholders at proper heights for specified lamps.
 6. Install trims after painting of spaces. Install trims tightly, with no gaps or light leaks.
 7. Where required by code, provide approved enclosures for fixtures in fire-rated ceilings at no additional cost to owner.
 8. Wallwashers:
 - a. Orient wallwasher housings according to manufacturer's instructions to maximize brightness on the upper portion of the wall.
 9. Lamp Orientation:
 - a. In situations where fixtures with horizontal lamps are aligned with each other, orient the lamps such that the axes of the lamps are in the same direction.
- C. Ceiling-Mounted and Pendant Fixtures:
1. Provide support for outlet boxes and suspension points so fixtures can be installed securely, including seismic supports per code.
 - a. Fixture weight less than 25 kg (50 lb.) at each suspension point: hang from strap or stud on outlet box, or at non-feed points, provide 1/4"-20 stud projecting 20 mm (3/4") below ceiling.
 - b. Fixture weight 25 kg (50 lb.) or more at each suspension point: hang directly from structure, either independent of outlet box or from stud extending through outlet box to structure.
 2. Suspended Fixtures:
 - a. Provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting.
 - b. Provide diagonal seismic restraint wires above ceiling per code.
 - c. Furnish suspended fixtures with UL Tested, factory-supplied stainless steel aircraft cable assemblies, complete with stainless cable stops, decorative canopies and flexible power connecting cords. Fixtures over 450 mm (18") wide shall be provided with supports at all corners.
 - d. Install suspended fixtures and fixture rows plumb and level.
 - e. Provide Unistrut channel mounting armatures for all continuous suspended fixture rows in the Apparatus Bay, as described and detailed on the Drawings.
 - f. Verify fixture weights and provide backing in ceilings as required.
- D. Wall-Mounted Fixtures:
1. Mounting heights shown on Drawings are measured from finished floor to centerline of outlet box or recessed housing, unless otherwise noted.
 2. Verify fixture weights and provide backing in wall as required. Fixtures must not droop or tilt away from wall.
 3. Provide custom cantilever bracket arms, fabricated from steel bar stock, and Unistrut channel alignment armatures, at all continuous-row linear fluorescent assemblies as called for on the Drawings.
 4. Wet locations: install sealant between fixture and outlet box.
 5. In circulation areas, wall-mounted fixtures must not project more than 100 mm (4") from wall if mounted above 685 mm (27") and below 2030 mm (80").
- 3.3 DELIVERY, STORAGE, & HANDLING:
- A. Deliver lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage. Inspect lighting fixtures immediately upon delivery to ensure correct shipment without damage.

- B. Store lighting fixtures in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity, laid flat and blocked off ground.
 - C. Handle lighting fixtures carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new. Protection wrapping on louvered (parabolic) fixtures shall not be removed until fixtures are ready for operation.
- 3.4 SEQUENCING AND SCHEDULING:
- A. General:
 - 1. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of lighting fixtures with other work.
 - 2. Sequence lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.
 - B. Install controls so all operable parts are at 1200 (48") max. height.
- 3.5 PROJECT CLOSEOUT
- A. Clean fixtures and remove plaster and paint spatters.
 - B. Clean fingerprints and dust from downlight reflectors. Refer to manufacturer's instructions.
 - C. Verify that fixtures and controls are working at time of final acceptance by Owner.
 - 1. Relamp as required.
 - D. Test emergency lighting system for 90 minutes in presence of Owner's representative, check each fixture for proper operation at end of 90-minute test, then recharge for 24 hours and briefly test each fixture again for proper operation.
 - E. Install and aim adjustable lighting as directed by Architect.
 - 1. Provide personnel, lifts, ladders, and walkie-talkies as required.
 - 2. Aiming will occur at night, outside of normal working hours, at times as approved by the Architect.
 - F. Spare Lamps:
 - 1. Provide the following spare lamps to the Client for their use after project closeout. Deliver to the jobsite and store lamps as directed by the Client in a clean, dry, and protected environment.
 - a. All lamp types:
 - (1). Provide 5% of the total quantity of each individual lamp type on the project - EXCEPT L.E.D.'s.
 - (2). Provide an additional 5% of the total quantity of each T5 type lamp on the project.
 - G. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hardcover binder. Deliver to Architect. After review, Architect will deliver one copy to Owner.
 - 1. One complete set of approved submittals, including product data and shop drawings.
 - 2. List of lamps used in Project, cross-referenced to fixture types, with specific manufacturer's names and ordering codes.
 - 3. Re-lamping instructions for lamps that require special precautions (tungsten halogen, metal halide, etc.).
 - 4. Lighting fixture-cleaning instructions, including chemicals to be used or avoided.
 - 5. Instructions for code-required testing and maintenance of emergency lighting system.
 - 6. Identification of lighting products that contain hazardous materials or that require special disposal techniques (large quantities of fluorescent lamps, etc.)

* End Division 26 *

Division 27 - COMMUNICATIONS

NOT USED

* End Division 27 *

Division 28 - ELECTRONIC SAFETY & SECURITY

1

FIRE ALARM SYSTEM

Section 28 31 00

PART 1 - GENERAL

1.1 DESCRIPTION:

- A These specifications include the furnishing, installation, and connection of the new fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, annunciator, power supplies, and wiring as shown on the drawings and specified herein.
- B All work shall comply with Sections 26 05 00 – Basic Electrical Requirements and 26 27 00 – Basic Electrical Materials and Methods.
- C Provide CBC compliant seismic installation. Provide Special Seismic Certification documentation as per CBC and ASCE/SEI requirements for all equipment defined as 'critical' with an importance factor of 1.5, as per Paragraph 1.10 of Section 26 05 00 (including all fire alarm equipment in this Section).
- D The Manufacturer shall provide certification by an approved agency that all fire alarm equipment, including all components, enclosure, mounting, and attachment is CBC compliant.
- E Seismic installation of fire alarm equipment: Based on Manufacturer's approved submittal, Contractor shall retain the services of a State of California registered Structural Engineer to prepare final installation details and drawings for equipment supports and attachments.

1.2 SCOPE:

- A This specification outlines the requirements for a microprocessor based, addressable (intelligent) automatic fire detection and alarm system. The system and components shall be supplied by one manufacturer of established reputation and experience who shall have produced similar apparatus for a period of at least five (5) years and who shall be able to refer to similar installations in public buildings rendering satisfactory service.
- B The work described in this specification consists of all labor, materials, equipment and services necessary and required to complete and test the automatic fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on drawings but required for proper performance and operation shall be furnished, installed, and connected complete.

1.3 REQUIREMENTS:

- A This installation shall be made in accordance with the drawings, specification and the following:
 - 1 National Electrical Code Article 760
 - 2 NFPA Standard 72
 - 3 Local Codes and Authorities Having Jurisdiction
 - 4 ADA requirements and regulations.

1.4 RELATED WORK:

- A Division 26 27 00: Basic electrical materials and methods
- B Mechanical Division: Fire protection systems
- C Mechanical Division: HVAC systems
- D Mechanical Division: Fire Smoke Dampers

1.5 FIRE DETECTION SYSTEM DESCRIPTION:

- A The system shall be a supervised non-coded 24 volt DC, Power Limited system and capable of having all addressable initiation devices in alarm at one time. Initiation and notification device circuits shall be wired Class B. A single ground or open on any initiating device circuit

- or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
- B Provide initiation, notification and other devices as per specifications and indicated on drawings.
 - C Indicate alarms, supervisory and trouble signals on the fire alarm control panel and the remote annunciator.
 - D Initiate signals to control HVAC system as per local AHJ requirements or as indicated on drawings.
 - E Transmit alarm signals to off-site reporting agency via a digital communicator, and dual phone lines.
 - F For buildings with elevators:
 - 1. Each elevator machine shall be provided with a smoke detector to facilitate elevator recall as outlined below.
 - 2. Each elevator machine room and the top of each elevator shaft shall be provided with a heat detector mounted within 2 feet of any sprinkler head (when sprinklers are provided), to facilitate elevator power shunt trip as outlined below.
 - 3. Each elevator landing shall be provided with a smoke detector to facilitate elevator recall as outlined below.
 - 4. Control modules shall be provided at the elevator machine room to initiate recall and alternate recall functions as outlined below.
 - 5. Control modules shall be provided at any elevator smoke doors to initiate smoke door release upon local landing smoke detector alarm.
 - 6. Activation of any machine room, elevator shaft, or elevator landing smoke detector shall initiate elevator recall functions to the main floor, via a signal to the associated control module. Exception; the main floor elevator landing or machine room detector shall initiate elevator recall to the alternate floor via a signal to the associated control module.
 - 7. Activation of any machine room or shaft heat detector shall initiate elevator main power shunt trip for disconnection of power prior to application of any water onto or into the elevator equipment or shaft, from the sprinkler system.
 - G The fire alarm system shall function as follows when any smoke or duct detector, water flow switch, manual station or other initiating device operates:
 - 1 Operate required audible/visual and visual devices as shown on the Drawings.
 - 2 Automatically notify off-site reporting agency.
 - 3 Indicate at the control panel alphanumeric display the number and location of the alarmed device.
 - 4 Light an indicating lamp on the smoke detector initiating the alarm.
 - 5 Light an indicating lamp on the remote annunciator indicating the location alarmed as well as the type of device alarmed (area smoke detector, duct detector, manual pull station, water-flow switch, ansul system panel, valve supervisory switch, etc.).
 - H Provide additional system features and capacities as indicated in Part 2 of this Section of the Specifications.
- 1.6 GUARANTEE:
- A All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.
- 1.7 SUBMITTALS:
- A Submit fire alarm shop drawings and product data sheets in accordance with Division 1 and Section 26 05 00.
 - B This Contractor shall submit the completed Fire Alarm Shop Drawings, with associated equipment cut sheets and CSFM listings, to the local Fire Department and submit for a separate Fire Alarm System Permit as required by the local authority. Final Fire Alarm System approval (by the AHJ) and Permit shall be based on the shop drawings submitted and completed by the Contractor. The design drawings are for overall system requirements and layout only.

- C Shop Drawings shall indicate the following: building floor plan, location and type of devices, conduit and wire quantities, power requirements, complete wiring point-to-point diagrams, details, and locations of fire alarm and remote annunciator panels.
 - D Submit manufacturer's installation instructions including back-box requirements for each piece of equipment.
 - E Submit manufacturer's operating instructions and maintenance data.
 - F Submit voltage drop and battery calculations.
 - G CBC Seismic Certificate of Compliance for all fire alarm equipment.
- 1.8 APPLICABLE PUBLICATIONS:
The publications listed below form a part of this specification.
- A National Fire Protection Association (NFPA) - USA:
 - No. 70 National Electrical Code (NEC)
 - No. 72 National Fire Alarm Code
 - No. 101 Life Safety Code
 - B Underwriters Laboratories Inc. (UL) - USA:
 - No. 268 Smoke Detectors for Fire Protective Signaling Systems
 - No. 864 Control Units for Fire Protective Signaling Systems
 - No. 268A Smoke Detectors for Duct Applications
 - No. 521 Heat Detectors for Fire Protective Signaling Systems
 - No. 464 Audible Signaling Appliances
 - No. 1971 Visual Signaling Appliances
 - No. 38 Manually Actuated Signaling Boxes
 - No. 346 Waterflow Indicators for Fire Protective Signaling Systems
 - C Local and State Building Codes.
 - D All requirements of the Authority Having Jurisdiction (AHJ).
- 1.9 APPROVALS:
- A The control panel and all peripherals shall have proper listing and/or approval from Underwriters Laboratory (UL) and be California State Fire Marshall listed and approved.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL:

- A All equipment and components shall be new, and the manufacturer's current model.
- B Acceptable System Manufacturers: Notifier, Siemens, Simplex, Firelite, or equal. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.
- C All Equipment shall be attached to and ceiling/floor assemblies and shall be held firmly in place. (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2 CONDUIT, BOXES, AND WIRE:

- A Conduit: All conduit and wire shall comply with section 26 27 00 of these specifications.
 - 1 Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
 - 2 Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
 - 3 Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
 - 4 Conduit shall be 3/4-inch minimum.
- B Wire:
 - 1 All fire alarm system wiring shall be new and installed in conduit.
 - 2 Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760). Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 16 AWG for initiating device circuits and signaling line circuits, and 12 AWG for Notification device circuits.
 - 3 All field wiring shall be completely supervised, Class B, with end-of-line devices located

as shown on the riser diagram.

- C Terminal Boxes, Junction Boxes and Cabinets:
 - 1 All boxes and cabinets shall be UL listed for their use and purpose.
- D The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the power panel as FIRE ALARM and include a breaker handle lock for the dedicated breaker. Fire alarm control panel primary power wiring shall be #12 AWG. The control panel cabinet shall be properly grounded.

2.3 CONTROL PANEL:

- A The control panel shall be microprocessor based and totally power limited. The panel shall be capable of supporting Class A (Style 6) or Class B (Style 4) Network Communications lines, and Class A (Style Z) or Class B (Style Y) Notification Circuits. The panel shall have the following features; Totally Field Programmable, Password Access Protection, Built in Panel Diagnostics, Alarm and Trouble Resound, Alarm Event Buffer, Trouble Status Buffer, Point Identification Display, 24 hour Trouble resound, One Man Walk Test, Alarm Verification, and Positive Alarm Sequence. The panel shall have the following relays with a form C configuration, Alarm, Trouble, Supervisory, and Default Alarm Mode (to allow alarm reporting during microprocessor failure).
- B The control panel shall be designed to monitor and process a minimum of 198 addressable inputs (smoke detectors, manual stations water flow devices, etc.), and up to 198 addressable monitor or control modules. The Network Communication Lines shall support various annunciation devices (i.e. LED Annunciators, Alphanumeric Displays, Printers) in addition to the addressable inputs and outputs described above. The system architecture shall allow for T-tapping of the Network Communications Lines. The use of a Zone Monitor module on the Communications Line shall further enhance the system with a master/slave concept, of allowing a group of conventional detection devices (standard smoke detectors, manual stations, waterflow and tamper switches) to be interfaced into the system as an address point. The system shall include individual power supply expander panels as required to support the notification loops. Each notification circuit shall be independently field programmable by the use of addressable control modules rated for the required current.
- C The control panel shall contain an Alphanumeric Display interface, which contains a microprocessor with a non-volatile memory to store field programmable alarm and trouble messages. The Alphanumeric Display shall consist of two 40-character lines for alarm, supervisory and trouble identification, and in quiescent mode, indicates system status.
- D The control panel shall have history reporting, with the history stored in either the alphanumeric or printer modules. The history shall be at least 1,000 events. These events can be alarm, verification, supervisory, trouble, acknowledge, system reset, walk test, and the use of any panel keypad keys and access to any panel modes such as Program or Test.
- E The control panel shall have self-diagnosis. Once the program is stored in memory and upon system initiating, if there is a discrepancy between the number of devices entered into the program and the actual number of devices connected to the system, the panel shall annunciate a trouble for the devices in question.
- F Power Supply
 - 1 The Power Supply for the Fire Alarm Control Panel may be integral or external to the Fire Alarm Control Panel, and shall provide all control panels and peripheral device power needs. Additional power required to operate all alarm devices (above and beyond the capacity of the main panel supply) shall be provided with power expander panel(s), connected to the alarm output of the main control panel. Provide all required interface modules and relays for proper notification circuit operation as per manufacturers instructions. Expander panel shall be as manufactured by the chosen Fire Alarm System manufacturer (qty. as required for full alarm operation).
 - 2 The power supply shall be designed to meet UL and NFPA requirements for power-limited operation on all initiating and notification circuits.
 - 3 Positive-temperature-coefficient thermistors, circuit breakers, fuses, or other over-current protection shall be provided on all power outputs.
- G Mechanical Design: The control panel shall be housed in a cabinet designed for mounting

directly to a wall or vertical surface. The back box and door shall be constructed of .060 steel with provisions for electrical conduit connections into the sides and top. No conduit penetrations shall be utilized on the back or bottom of the panel. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. The cabinet shall be approximately 5 inches deep and 14.5 inches wide. Height shall be approximately 16 inches.

2.4 INITIATION DEVICES:

- A The manufacturer of choice, Addressable Photoelectric Smoke detectors, (Intelligent) shall be provided as indicated on the drawings, with features and characteristics as follows:
 - 1 The detector shall be self-compensating for ambient temperature and humidity.
 - 2 The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester. The detector readout shall yield a discrete electrical value for status tracking and logging for determining maintenance and cleaning requirements.
 - 3 The detector shall be suitable for two-wire operation and two way communication on the intelligent analog signaling circuits.
 - 4 The detectors furnished shall be listed for use in environments as covered by Factory Mutual, UL and shall be installed according to the requirements of NFPA 72 for open area coverage.
 - 5 Detectors for magnetic door hold open functions shall be provided with an auxiliary relay base for auxiliary function wiring connections.
 - a Door holder power shall be routed via the relay base on smoke detectors denoted with an "R" to release the associated doors upon alarm.
- B Heat detectors shall be provided as indicated on drawings. Heat detector shall be of the rate compensation type, 135 degree.
- C Duct Detectors:
 - 1 Duct detectors, complete with all required sampling tubes and housings, should be provided and connected complete by this contractor, installed by the mechanical contractor. Coordinate with the mechanical contractor.
 - 2 Duct Detectors shall be connected to the air handler starter unit, in order to facilitate unit shutdown upon alarm (via an auxiliary relay in the duct detector). Coordinate exact control wiring with mechanical contractor. Provide and install all required wiring and conduit for starter/duct detector interface.
 - 3 Provide and install power connection to each duct detector as required. Coordinate with mechanical contractor.
 - 4 Provide Nema 3R exterior rated housings for all exterior duct detectors.
- D Manual Stations, (Intelligent) shall be single action and semi-flush or surface mounted as indicated on the drawings.
 - 1 The manual station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring.
 - 2 The manual stations shall be addressable and identifiable by the master fire alarm control panel when they are resident on the analog loop. Address programming shall be accomplished electronically and reside within the station in non-volatile memory.
- E A monitor module Interface device shall be provided for required interface points such as water flow devices and tamper switches, or any contact type devices as indicated on drawings. This Interface device shall have one or two Class B (Style 4) circuits as required.
- F Carbon Monoxide Detectors shall be an addressable multi-criteria smoke detector with a separate signal for carbon monoxide (CO) detection per UL 2075 standards (Notifier #FCO-851, or equal).
 - 1 The detector shall be comprised of four sensing elements, including a photoelectric (light-scattering) particulate sensor, an electrochemical CO sensor, a daylight-filtered infrared (IR) sensor and solid state thermal sensor(s) rated at 135°F (57.2°C). The device shall be able to indicate distinct smoke and heat alarms.
 - 2 Detector shall be furnished with intelligent sounder base which can generate either Temp 3 pattern for fire or a Temp 4 patter for CO alarm indications (Notifier #B200S, or equal)

- 3 The CO detector component shall be capable of a functional gas test using a canned test agent to test the functionality of the CO sensing cell.
 - 4 The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms.
 - 5 The detector shall indicate CO cell end of life warning and fault.
- 2.5 REMOTE ANNUNCIATOR:
- A A remote annunciator shall be provided as shown on the plans. The annunciator shall be wall mounted in a multi-gang box or as required. It shall provide a 80 character display to indicate the zone(s) in alarm and LED's for system trouble and supervisory conditions.
- 2.6 BATTERIES
- A Batteries shall be 12 volt, sealed Gell-Cell type, with combined Amp-Hour ratings as required by code.
 - B Battery shall have a minimum sufficient capacity to power the fire alarm system for not less than twenty-four hours in standby mode, plus 5 minutes of full system alarm upon a normal AC power failure.
 - C The batteries are to be completely maintenance free, no liquids required. Fluid level checks, refilling shall not be required. Spills and leakage are not allowed.
- 2.7 CONTROL DEVICES:
- A Control modules shall be provided as indicated on the drawings for fire alarm output functions. These devices shall be connected to the Network Communications Lines, and be field programmable for one of the following options; Remote Relay (form C 1amp 24vdc, 200ma 120vac) with supervised relay operation, Remote Supervised Indicating Appliance Circuit (fused at 1 amp). There shall be an LED on the device that will flash to indicate the unit is being monitored and a steady LED to indicate the unit has been activated. Secondary relays with control power connections shall be provided as required where contact ratings (voltage & amps) so dictate.
- 2.8 NOTIFICATION DEVICES:
- A Horn/Strobe combinations shall be provided as indicated on drawings. The horn / strobe combination shall be Wheelock or equal, ADA and UL 1971 compliant (candela values as required) - White finish.
 - B Strobe Lights shall be provided as indicated on drawings. The strobe lights shall be wall mounted at +80" AFF or 6" below the ceiling level, whichever is lower, Wheelock or equal, ADA and UL 1971 compliant (candela values as required) - White finish.
- 2.9 FIRE / SMOKE DAMPERS:
- A Fire / Smoke dampers (FSD's) are provided and installed by Division 15. This contractor shall provide and install a 120V power connection to each damper, wired to keep the damper in the open position under normal conditions.
 - B An integral duct smoke detector will be provided by Division 15. This contractor shall provide and install an addressable monitor module, connected to the alarm contacts on the duct detector, to monitor the condition of the detector and annunciate an alarm condition to the main control panel upon detection of smoke.
 - C This contractor shall wire the 120V control power for the FSD's via an auxiliary alarm contact in the detector base, to automatically close the damper upon smoke detection. Coordinate all provisions with the mechanical contractor and engineer.
 - D All FSD provisions shall comply with the applicable sections and requirements of the CBC and the local AHJ.
 - E Every effort has been made to indicate all required damper locations at rated partitions in coordination with Division 15 work. This contractor shall coordinate with the sub-mechanical contractor to identify all required locations for FSD's and provide connections to all units as required by code. The architectural drawings indicate by symbol, all such rated partitions. No extra cost shall be approved for additional required connections not shown on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
- B All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.
- C All fire detection and alarm system devices, control panels and remote annunciator shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- D At the final inspection a factory-trained representative of the manufacturer of the major equipment shall perform the tests in Section 3.2 TESTING.
- E **WIRING:**
 - 1 All circuits shall be in conduit, minimum 3/4".
 - 2 Addressable loops circuits shall be two (2) conductor twisted/shielded or wiring approved by the manufacturer. Notification circuits shall be 12 AWG minimum for strobes, but not to exceed manufacturers wire capacity for modules. Control power circuits shall be 14 AWG minimum or as required.

3.2 TESTING:

- A Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.
 - 1 Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
 - 2 Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
 - 3 Verify activation of all flow switches.
 - 4 Open initiating device circuits and verify that the trouble signal actuates.
 - 5 Open and short all notification appliance circuits and verify that trouble signals actuate.
 - 6 Ground circuits and verify response of trouble signals.
 - 7 Check presence and audibility of tone at all alarm notification devices.
 - 8 Check installation, supervision, and operation.
 - 9 Verify that each initiating device alarm is properly received and processed by the FACP (Walk Test).
 - 10 Conduct tests from the FACP to verify trouble indications for common mode failures, such as alternating current power failure.
- B Test reports shall include, but not be limited to:
 - 1 A complete list of equipment installed indicating proper operations as listed above.

3.3 FINAL INSPECTION:

- A Final acceptance will require the contractor to deliver to the Owner the following;
 - 1 Three (3) copies of the operating instructions and system maintenance manuals.
 - 2 Three (3) sets of record drawings.
 - 3 Three (3) copies of the final test reports.
 - 4 Three (3) copies indicating the name and phone number of person to contact in the event of equipment failure, and date when system warranty will be terminate.
 - 5 Three (3) sets of data sheets for each piece of equipment supplied.
- B The fire alarm system subcontractor or manufacturer shall offer for the owner's consideration at the time of system submittal a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72.
 - 1 The services offered under this contract shall be performed at no charge during the first year after system acceptance and the owner shall have the option of renewing for single or multiple years, up to five years, at the price quoted in bid.
 - 2 The contractor performing the contract services shall be qualified and listed to maintain

ongoing certification of the completed system to the UL for specific installed system listing.

3.4 WARRANTY

A The fire detection system shall be warranted for a period of one year from date of acceptance. The warranty shall cover parts, labor, and travel to and from the site.

3.5 INSTRUCTION:

A Provide complete instruction manuals and training to the building personnel. "Hands-on" demonstrations of the operation of all system components and the entire system shall be provided.

* End division 28 *

Division 29 and 30 - UNASSIGNED

NOT USED

* End Division 30 *

Division 31 - EARTHWORK

EARTHWORK

Section 31 20 10

1. GENERAL:

A. SUMMARY:

1. General: Provide Earthwork, as shown and specified per Contract Documents.
2. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Supplemental Special Conditions:
 - c. Environmental Procedures: Refer to Section 01 35 43.13 - SAFETY AND ENVIRONMENTAL PROCEDURES FOR HAZARDOUS WASTE.
 - d. Management and Disposal of Waste: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - e. Demolition: Refer to Section 02 41 00 - DEMOLITION.
 - f. Dewatering: Refer to Section 31 23 19 - DEWATERING.

B. REFERENCES:

1. General: Refer to the Supplemental Special Provisions, "Greenbook" and "White Book", and utility company standards and requirements.
2. American Association of State Highway and Transportation Officials (AASHTO): Standards.
3. American National Standards Institute (ANSI): Standards.
4. American Public Works Association (APWA): Standard Specifications for Public Works Construction.
5. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - b. ASTM D2487: Classification of Soils for Engineering Purposes.
6. State of California, Department of Transportation (CalTrans):
 - a. Specifications: CalTRANS Standard Specifications.
 - b. Plans: CalTRANS Standard Plans.
7. California Occupational Safety and Health Administration (CalOSHA): Construction Safety Orders.
8. California State Industrial Accident Commission (CSIAC): Trench Construction Safety Orders.
9. U.S. Occupational Safety and Health Administration (OSHA): Standards - 29 CFR, PART 1926 Safety and Health Regulations for Construction, Subpart P - Excavations.

C. SUBMITTALS:

1. General: Submit product data, shop drawings, samples and test reports.
2. Closeout: Provide as-built survey prepared by registered Land Surveyor; review and acceptance by Architect.

D. QUALITY ASSURANCE:

1. Reference Documents:
 - a. Site Data:
 1. Subsurface Investigation: Soil and subsurface investigations were conducted at the site, the results of which are to be found in the report issued by Leighton and Associates, Inc. and dated April 3, 2009.
 2. Site Survey and Topographic Information: A site survey was made by Nasland Engineering and dated October 1, 2010, and is basis for data regarding original surface conditions.
2. Testing:
 - a. General: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 - b. Geotechnical Engineer: A Geotechnical Engineer will be retained by the City Representative to observe performance of and determine compliance with excavation, trenching, filling, backfilling and grading requirements; and perform compaction tests.
 - c. Retesting: Paid for by Contractor.

2. PRODUCTS:

A. MATERIALS:

1. Fill Materials:

a. Engineered Fill:

1. General: Existing on-site materials supplemented with import material as needed to meet the following requirements.
2. Import Fill: Inorganic R value of 25, liquid limit less than 35, plastic index less than 10, with the following gradations:

<u>Sieve Size</u>	<u>Percentage Passing</u>
4 inch	100 percent
3/4 inch	70 percent
No. 4	100 percent
No. 200	50 percent

3. On-site Fill: Inorganic, no rocks larger than 6 inches, liquid limit of less than 40 and plastic index less than 15.

4. Backfill:

- a) General: Granular, non-expansive soil; free of organic or deleterious material, no rocks larger than 6 inches, and with not more than 15 percent of the rocks or lumps larger than 2-3/8 inches in their greatest dimension.
- b) Sand: Natural river or bank sand; washed, free from organic and other foreign material.

5. Base, Drain and Aggregate Fill:

- a) General: ASTM D2940; materials free of silt, clay, loam, shale, friable or soluble materials, debris, vegetation and foreign matter.
- b) Coarse Gravel: 1/2 inch minimum, 2 inch maximum; crushed natural stone.
- c) Pea Gravel: 1/4 inch minimum, 5/8 inch maximum; natural stone.
- d) Permeable Base Material: Refer to CalTRANS Section 68, Class 2.
- e) Drainage Fill: ASTM D448; washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel.

6. Concrete Fill: Refer to Section 03 30 00 - CAST-IN-PLACE CONCRETE.

2. Water: Potable; free of deleterious materials.

3. EXECUTION:

A. PREPARATION:

1. Environmental Requirements: Do not place, spread or compact fill material during unfavorable weather conditions. When work is interrupted by rain, do not proceed with fill operations until field tests indicate that moisture content and density of previously placed fill is satisfactory.
2. Examination: Examine conditions of work in place before beginning work; report defects.
 - a. General: Verify site conditions shown, report all unidentified conditions to the City's Representative.
 - b. Utilities: Should unknown active utilities be encountered during work, halt operation and promptly notify the City's Representative. Do not proceed until identified and instructions are received from responsible utility company.
3. Archaeological Artifacts: Should any objects of possible historic interest be encountered during operations, halt work in area of discovery and immediately contact the City's Representative for notification of appropriate authorities.

B. LAYOUT:

1. General: Establish lines, levels and grades; locate work, including existing underground utilities; set markers and stakes.
2. Trees and Shrubs: Tag or identify existing plant life designated to remain.

C. PROTECTION:

1. General: Erect and maintain barricades and protection facilities, as required.
2. Bench Marks: Protect survey control points from damage or displacement. Replace displaced benchmarks.
3. Utilities: Maintain and protect existing utilities to remain.
4. Underpinning: Underpin adjacent structures, including service utilities and pipe chases, as required to prevent damage by excavation work.
5. Shoring, Sheet piling, Lagging and Bracing: Provide as required to maintain excavations and banks in a safe and stable condition.
6. Trees: Carefully protect existing trees and shrubs identified to remain. Replace existing trees and shrubs outside building area damaged by operations.
7. Blasting: Not permitted.
8. Drainage: Grade off excavation top perimeter to prevent surface water run-off into excavation or to adjacent properties. Keep excavations and sub-grade area free from water during process of work, regardless of cause, source or nature of water.

9. Dust Control: Wet as required.
- D. PERFORMANCE: **[TOP]**
1. General: Provide all grading, excavating and cutting necessary to conform finish grade and contours as shown. Cuts shall be made to true surface of subgrade.
 2. Compaction: ASTM D1557 Compaction Test method; value of optimum moisture content and density will be determined by the Testing Laboratory.
 3. Excavation:
 - a. General: Excavation is unclassified and includes excavation to sub-grade, regardless of materials encountered.
 - b. Subsoil: Excavate subsoil required for building foundations, slabs, construction operations and other work. Stockpile subsoil in designated area on site; remove excess subsoil not being reused from site. Protect stockpiled subsoil from erosion until removed for final placement.
 - c. Overexcavation:
 1. General: Additional excavation required at building and paved areas; restore overexcavations to required elevation with select engineered fill material compacted to 95 percent of dry density.
 2. Building Areas: Excavate loose soils beneath building areas to minimum depth of 2'-0" below bottoms of footings, or existing grade, whichever is lower. Extend excavation minimum 3'-0" beyond building lines.
 3. Unsuitable Ground: Report errors in excavation or soft ground found when excavating to the City's Representative; do not build on any soft or unsuitable surface. Repair as directed by the City's Representative.
 - d. Trenches:
 1. Plumbing and Piping: Excavate sufficiently wide to enable installation and allow for inspection.
 2. Footings: Excavate to adequate width to allow for installation of formwork.
 4. Filling and Backfilling:
 - a. Subsoil:
 1. General: Remove shoring, sheeting, lagging and bracing prior to commencing operations. Fill to contours and elevations shown. Use select engineered fill material at building and paving areas; general engineered fill elsewhere. Place in layers not exceeding 6 inches in thickness; rocks larger than 1 inch not permitted in the upper 12 inches of fill. Thoroughly mix and spread each layer evenly to ensure uniformity. When moisture content is above that required, aerate with blade or other methods until moisture content is satisfactory.
 2. Compaction: Perform fill and backfill operations under supervision of Geotechnical Engineer who will make field density tests to check compaction of fill material. After each layer has been placed, mixed and spread, thoroughly compact to 95 percent of maximum dry density while at required moisture content. Backfill with material excavated, unless otherwise shown. Place in 6 inch layers and compact each layer to specified density. Backfill simultaneously on each side of unsupported foundation walls.
 - b. Aggregate:
 1. General: Do not place fill on soft, muddy, or frozen surfaces.
 2. Base Course: Spread aggregate over prepared substrate to a total compacted thickness as shown.
 3. Gravel Fill: Combination of coarse and fine gravel; place after underground work and foundations are in place; compact to 95 percent.
 4. Drainage Fill: Coarse gravel; place as shown.
 5. Finish Grading: Place topsoil to tolerance of plus or minus ½ inch of finished elevations.
- E. FIELD QUALITY CONTROL
1. Field Testing: Refer to Section 01 45 23 - TESTING AND INSPECTION SERVICES.
 2. Retesting: Make necessary corrections to non-conforming work; retest at Contractor's expense.

* * *

DEWATERING

Section 31 23 19

1. GENERAL:

A. SUMMARY:

1. General: Provide Dewatering, as shown and specified per Contract Documents.
2. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Supplemental Special Conditions:
 1. Section 703: Encountering or Releasing Hazardous Substances.
 2. Section 705: Water Discharges.
 - c. Environmental Procedures: Refer to Section 01 35 43.13 - SAFETY AND ENVIRONMENTAL PROCEDURES FOR HAZARDOUS WASTE.
 - d. Management and Disposal of Waste: Refer to Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT.
 - e. Demolition: Refer to Section 02 41 00 - DEMOLITION.
 - f. Excavation: Refer to Section 31 20 10 - EARTHWORK.

B. PERFORMANCE REQUIREMENTS:

1. General: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
2. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer licensed in the state of California, using performance requirements and design criteria indicated. Obtain all permits required to install and maintain the dewatering system.
3. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
4. Prevent surface water from entering excavations by grading, dikes, or other means.
5. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
6. Remove dewatering system when no longer required for construction.

C. REFERENCES:

1. City of San Diego
 - a. Standard Specifications for Public Works Construction, ("White Book"):
 1. Section 804: Sewage Spill Prevention.
 2. Section 805: Water Discharges.
 3. Section 808: Asbestos Materials.
2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
3. State of California, Department of Industrial Relations (Cal/OSHA): Title 8, California Code of Regulations.
4. U. S. Environmental Protection Agency (EPA): Laws and regulations.

D. SUBMITTALS:

1. General: Submit product data.
2. Shop Drawings:
 - a. General: Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
 - b. Dewatering System: Provide layouts of piezometers and flow-measuring devices for monitoring performance.
 - c. Written Plan: Provide for dewatering operations including control procedures to be adopted if dewatering problems arise.
 - d. Delegated-Design Submittal:
 1. General: Submit three copies of a statement, signed and sealed by the responsible design professional, for each system specifically assigned to Contractor to be designed or certified by a design professional.
 2. For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - e. Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations; refer to Section 01 32 33 - PHOTOGRAPHIC DOCUMENTATION.

3. Regional Water Quality Control Board (RWQCB) - San Diego and Metropolitan Wastewater permits.

E. QUALITY ASSURANCE:

1. Qualifications:
 - a. Delegated Design Documents: Prepared by an civil engineer registered to practice in the State of California.
 - b. Installer: Specialized in the work of this Section with minimum three (3) years documented experience.
2. Preinstallation Conference:
 - a. General: Conduct conference at Project site. Review methods and procedures related to dewatering including, but not limited , the following:
 - b. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
 - c. Geotechnical report.
 - d. Coordination with hazardous materials mitigation requirements.
 - e. Proposed site clearing and excavations.
 - f. Existing utilities and subsurface conditions.
 - g. Coordination for interruption, shutoff, capping, and continuation of utility services.
 - h. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - i. Testing and monitoring of dewatering system and effluent.

2. PRODUCTS:

Not Used

3. EXECUTION:

A. PROJECT CONDITIONS:

1. General: Site Conditions will dictate design and use of dewatering operations.
2. Interruption of Existing Utilities: Refer to Section 02 41 00 - DEMOLITION.
3. Project-Site Information:
 - a. General: A geotechnical report has been prepared for this Project and is available for review; refer to Section 31 20 10 - EARTHWORK.
 - b. Make additional test borings and conduct other exploratory operations necessary for dewatering.
4. Survey Work:
 - a. General: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - b. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction

B. PREPARATION:

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 - a. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - b. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
2. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by jurisdictional authorities.
3. Provide temporary grading to facilitate dewatering and control of surface water.
4. Monitor dewatering systems continuously.
5. Promptly repair damages to adjacent facilities caused by dewatering.
6. Protect and maintain temporary erosion and sedimentation controls, refer to Section 31 25 13 - EROSION CONTROL.
7. Dewatering effluent to sanitary sewer shall require prior approval from jurisdictional authorities.
8. A dewatering plan shall be submitted as part of the SWPPP/WPCP detailing the location of dewatering activities, equipment, and discharge point; refer to Section 31 25 13 - EROSION CONTROL.

9. If the presence of polluted water with hazardous substances is identified in the contract documents, the Contractor shall implement dewatering pollution controls as required by the contract documents.
- C. INSTALLATION:
1. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - a. Space well points or wells at intervals required to provide sufficient dewatering.
 - b. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
 2. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
 3. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - a. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
 4. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - a. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
 5. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others and is in conformance with local permits, project specific permits, and regulations. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
 6. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
 - a. The standby source of power or pumping unit(s) should be operated a minimum of 4 hours per week.
 - b. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction and in accordance with the local procedures, requirements, and regulations.
 7. Damage: Promptly repair damage to adjacent facilities caused by dewatering operations.
- D. FIELD QUALITY CONTROL:
1. Observation Wells: Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated; additional observation wells may be required by authorities having jurisdiction.
 - a. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
 - b. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
 - c. Plug or fill observation wells, remove piezometers, and fill holes when dewatering is completed.
 2. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

* * *

SHORING AND UNDERPINNING

Section 31 40 00

1. GENERAL:

A. SUMMARY:

1. General: Provide Shoring and Underpinning, as shown and specified per Contract Documents.
2. Related Work:
 - a. General: The following items of Work are related to the Work of this Section but specified elsewhere in this Project Manual.
 - b. Existing Condition Documentation: Refer to Section 01 32 33 - PHOTOGRAPHIC DOCUMENTATION.
 - c. Hazardous Materials: Refer to Section 01 35 43.13 - ENVIRONMENTAL PROCEDURES FOR HAZARDOUS WASTE.
 - d. Hazardous Waste Mitigation: Refer to Section 02 50 00 - SITE REMEDIATION.
 - e. Earthwork: Refer to Section 31 20 10 - EARTHWORK.
 - f. Water Removal: Refer to Section 31 23 19 - DEWATERING.

B. REFERENCES:

1. General: Refer to the Supplemental Special Provisions, "Greenbook" and "White Book".
2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section.
3. State of California, Department of Transportation (Caltrans), Office of Structure Construction,
4. State of California, Department of Transportation (CalTrans):
 - a. General: CalTRANS Trenching and Shoring Manual.
 - b. Specifications: CalTRANS Standard Specifications.
 - c. Plans: CalTRANS Standard Plans.
5. State of California, Department of Industrial Relations (Cal/OSHA):
 - a. General: Title 8 - California Code of Regulations (CCR).
 - b. Division 1, Chapter 4, Subchapter 4: Construction Safety Orders.
 - c. Chapter 4, Subchapter 4, Subchapter 19: Trench Construction Safety Orders
6. U.S. Occupational Safety and Health Administration (OSHA): 29 CFR 1926 - Safety and Health Regulations for Construction, Subpart P - Excavations.

C. DEFINITIONS:

1. Parcel: An area as indicated, including the structures thereon, and any vaults and permanent closure walls connected thereto.
2. Shoring: Props or posts of timber or other material in compression or bending, used for temporary support of excavations, formwork, or unsafe structures.
3. Sheeting: A line of timber or planks, plain or tongue-and-grooved on sides, driven endwise into the ground to protect subgrade operations.
4. Underpinning: Permanent construction, as indicated, which directly transmits existing structure foundation loads to a lower bearing elevation or strata, and which preserves the structures being underpinned.
5. Support: Facilities required to prevent movement of existing structures until the completion of the underpinning.
6. Restoration: Reconstruction by repair or replacement of portions of structures removed or altered by underpinning and support operations.

D. SUBMITTALS:

1. General: Submit product data, samples and test reports.
2. Excavating, Shoring, and Underpinning Program: Submit a written schedule and procedure, along with detailed drawings, of the proposed excavations, shoring, and underpinning work.
3. Shop Drawings:
 - a. General: Submit drawings indicating method, staging, and necessary details for construction of underpinning and support for each structure on which work is to be performed. Show details of shop assemblies when required for restoration of structures.
 - b. Calculations: Submit design analyses and calculations to support Shop Drawings.
4. Procedures: Submit procedure for detection of movement, preloading new foundations, and for proof load testing and preloading of lateral support systems.
5. Restoration: Submit procedures, methods, and materials lists for restoration of structures and facilities.

E. QUALITY ASSURANCE:

1. Qualifications:
 - a. Shop Drawings and Calculations: Prepared by a Civil or Structural Engineer registered in the State of California.
 - b. Installer: Specializing in the work of this Section with minimum three (3) years documented experience.
2. Preinstallation Conference: Conduct conference at Project site. Review methods and

procedures related to dewatering and hazardous materials mitigation requirements.

2. PRODUCTS:

A. MATERIALS AND EQUIPMENT:

1. General: Provide materials, tools, equipment, facilities, and services required the necessary shoring and underpinning work and facilities, as shown.
2. Jacks and Jacking Equipment: Provide equipment more than adequate for the imposed loads, with calibrated gages.

3. EXECUTION:

A. PREPARATION:

1. General: Take detailed photographs of existing structures foundations as earthwork progresses; refer to Section 01 32 33 - PHOTOGRAPHIC DOCUMENTATION.

B. INSTALLATION:

1. General: Install in conformance with referenced requirements standards
2. Shoring: Install as shown on the Drawings, and as specified.
3. Underpinning: Install in conformance with approved materials and procedures for restoration of structures and facilities.
4. Restoration: Restore existing structures to conditions equivalent to those existing prior to the start of shoring and underpinning work, including repair of any settlement-related damage.

* End Division 31 *

Division 32 - EXTERIOR IMPROVEMENTS

LANDSCAPE MAINTENANCE

Section 32 01 33

1. GENERAL:

A. SUMMARY:

1. General: Provide Landscape Maintenance, as shown and specified per Contract Documents.
2. Work Included:
 - a. 180 day maintenance for GreenRoof planting.
 - b. 90 day maintenance for all other planting.
 - c. Weeding.
 - d. Fertilization.
3. Related Work:
 - a. Green Roof: Refer to Section 07 76 53 - GARDEN ROOF DECK ASSEMBLY.
 - b. Irrigation: Refer to Section 32 84 00 - PLANTING IRRIGATION.
 - c. Planting: Refer to Section 32 93 10 - TREES, PLANTS AND GROUND COVER.

B. QUALITY ASSURANCE:

1. Provide services by an experienced landscaping maintenance company, with minimum five (5) years documented experienced. The Contractor or an experienced foreman shall be present at all times during installation.

C. MAINTENANCE PERIOD:

1. Continuously maintain all site areas involved in this contract during the progress of work and during the maintenance period until final acceptance of the work by City. Improper maintenance or possible poor condition of the project at the termination of the scheduled maintenance period may cause postponement of the final completion date of the Contract at no additional cost to City. Continue maintenance until acceptable to the City.
2. Provide sufficient numbers of workers and adequate equipment to perform work during maintenance period.
3. Maintenance period does not start until all elements of construction, planting, and irrigation for the complete project are in accordance with the contract documents for this project.
4. Request an inspection to begin maintenance period after all planting and related work has been completed in accordance with contract documents. Maintenance period commences as described in written notification by the City.
5. Prior to commencement of maintenance period, ensure that all ground covers and shrub areas have been planted.
6. Any day or days that there is failure to properly maintain plantings, replace suitable plants, perform weed control or maintain hardscape areas will not be credited as part of the Maintenance Period. The project will not be segmented into maintenance phases.
7. Keep paved areas free of silt, dirt, leaves and other planting area debris. Maintain these areas at least broom clean through the duration of the maintenance period, cleaning no less often than once per week.

D. GUARANTEE AND REPLACEMENT:

1. Guarantee: Guarantee plant material against any and all poor, inadequate or inferior materials and workmanship for one year. Replace plants found to be dead or in poor condition due to faulty materials or workmanship, at no extra cost to City.
2. Replacement: Replace materials found to be dead, missing or in poor condition during the maintenance period immediately. The City Representative is the sole judge of the acceptability of condition. Make replacements of materials within 15 days after condition develops or written notification from City has been sent. City has the right to make emergency repairs without releasing Contractor's guarantee and warranty to City.

E. INSPECTIONS:

1. Request normal progress inspection at least 72 hours in advance of an anticipated inspection. Inspections are as follows:
 - a. Immediately prior to commencement of this maintenance work.
 - b. Completion of first 90 day Maintenance Period.
 - c. Completion of first 180 day Maintenance Period (for Green Roof).
 - d. Final acceptance.

F. PROJECT FINAL ACCEPTANCE:

1. Prior to date of final inspection, acquire approved reproducible prints and finally record from the job record set, all changes made during construction and deliver them to City.
2. Deliver guarantees to City.

2. PRODUCTS:

A. MATERIALS:

1. Ensure that all materials conform to other sections of these specifications for planting and irrigation, and as acceptable to City.
2. Provide monthly record of all herbicides, insecticides and disease control chemicals used on site.

3. EXECUTION:

A. MAINTENANCE:

1. Weed and cultivate all areas at intervals of not more than 7 days.
2. Perform watering, mowing, rolling, edging, trimming, fertilization, spraying, pest control, and cleaning as may be required.
3. Street gutters and curbs are to be included.
4. Maintain adequate protection for people and property, and be financially responsible for damages and injuries. Notify City immediately should damage occur as a result of maintenance operations and provide repair or remuneration as required by City.

B. TREE AND SHRUB CARE:

1. Watering: Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering, use a water wand to break force of water.
2. Pruning:
 - a. Prior to any pruning obtain written approval from the City to proceed.
 - b. Trees:
 1. Propose tree pruning to the City should there be health or structural reasons for doing so, including the need to eliminate diseased or damaged growth, eliminate structurally unsound growth, reduce potential for wind toppling or wind damage, or maintain growth within limited space.
 2. If requested by the City provide pruning for aesthetic enhancement according to "Pruning" by Sunset Books.
 3. Major pruning of deciduous trees shall be during their dormant season.
 - c. Shrubs:
 1. The objectives of shrub pruning are the same as for trees. Do not clip shrubs into balled or boxed forms unless such is required by the design.
 2. Make pruning cuts to lateral branches or buds or flush with trunk. Stubbing will not be permitted.
3. Staking and Guying: Ensure that stakes and guys remain in place through acceptance and monitor to prevent girdling of trunks or branches and to prevent rubbing that causes bark wounds. All nursery stakes shall be removed.
4. Weed Control: Keep all areas free of weeds. Use recommended legally approved herbicides. Avoid frequent soil cultivation that destroys shallow roots. Use mulches per specifications to help prevent weed seed germination.
5. Insect and Disease Control: Maintain a reasonable control with approved materials.
6. Fertilize as specified by the agronomic soils testing recommendations and as follows for bid purposes:
 - a. Commencement of maintenance period - 6 pounds per 1,000 square feet with top dress fertilizer.
 - b. At end of first 30 days of maintenance period - 6 pounds per 1,000 square feet with top dress fertilizer.
 - c. At end of maintenance period and at 30 day intervals should maintenance period be extended for any reason - 6 pounds per 1,000 square feet with fertilizer mix.
 - d. Avoid applying fertilizer to the root ball and base of main stem; rather, spread evenly under plant to drip line. Rates will vary from about a cup of nitrate fertilizer (depending upon nitrogen percentage) around a newly installed small plant to about 1/2 pound of actual nitrogen per inch of trunk diameter measured four feet from the ground for mature trees.
7. Replacement of plants: Replace dead, dying and missing plants with plants of a size, condition and variety acceptable to City at no additional cost to the City.

C. GROUND COVER CARE:

1. Weed control: Control weeds, preferably with pre-emergent herbicides, but also by hand or with selective systemic herbicides. Hoe weeds as little as possible since this may result in plant damage.
2. Watering: Water enough that moisture penetrates throughout root zone and only as frequently

- as is necessary to maintain healthy growth.
3. Trash: Remove as it accumulates, but no less often than weekly.
 4. Edging and trimming: Edge ground cover to keep in bounds.
 5. Replace dead and missing plants at no additional cost to the City.
- D. IRRIGATION SYSTEM:
1. Inspection: Check all systems for proper operation. Lateral lines must be flushed out after removing the last sprinkler head or two at each end of the lateral. Adjust heads as necessary for unimpeded coverage and no overspray.
 2. Controllers: Set and program automatic controllers for seasonal water requirements. Give City a key to controllers and instruction on how to turn off system in case of emergency as specified in other sections of these specifications.
 3. Repair all damages to irrigation system at no additional cost to the City. Make all repairs within one watering period.

[TOP]

GARAGE PAVING SPECIALTIES

Section 32 17 00

1. GENERAL:

- A. SUMMARY: Provide Garage Paving Specialties, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. General: Refer to the Supplemental Special Provisions, "Greenbook" and "White Book".
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. Americans with Disabilities Act (ADA):
 - a. General: Americans with Disabilities Act of 1990, ADA - 42 U.S. Code Chapter 126.
 - b. ADA Standards for Accessible Design: U.S. Department of Justice, 28 CFR Part 36.
 - 4. Master Painters Institute (MPI): Painting Manuals.
 - 5. National Paint and Coatings Association (NPCA): Guide to U.S. Government Paint Specifications.
 - 6. State of California, Department of Transportation (CalTrans): CalTRANS Standard Specifications.
- C. SUBMITTALS:
 - 1. General: Submit product data and a certificate stating compliance with federal, state and local VOC regulations.
 - 2. Samples:
 - a. General: Submit manufacturer's standard colors for each surface finishing product specified.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by Owner.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-11 and GS- 36.
 - 2. Precast Concrete Bumpers:
 - a. General: Bumper Block manufactured by Christy Concrete Products, Inc.
 - b. Alternate Manufacturers: Comparable products manufactured by Teichert Precast, or accepted equal.
 - 3. Pavement-Marking Paint:
 - a. General: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes; formulated specifically for marking traffic lines on and portland cement concrete paving, in compliance with California Air Resources Board (CARB) and local air quality authorities.
 - b. Parking and Traffic Control Markings: Provide reflective materials.
 - c. Colors: Selected by Architect.
 - d. Abrasive Grit: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent white aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
 - 4. Tactile Warning Tile:
 - a. General: Tek Way Dome Tiles manufactured by StrongGo Industries (LLC).
 - b. Alternate Manufacturers: No known equal.
 - c. Size and Type: As shown.
 - d. Color: As selected by the Architect.
 - e. Fasteners: Stainless steel as recommended by manufacturer.
 - f. Adhesive: Manufacturer's standard structural elastomeric.
 - g. Sealant: Refer to Section 07 92 10 - JOINT SEALERS.
- B. MIXING: Mix paints at the factory; do not alter or reduce materials except as directed by manufacturer.

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements: Do not apply pavement marking or tactile warning tile during inclement weather conditions, or when surface temperatures exceed 95 deg F or are under 50 degrees F.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.

3. Measurements: Take field measurements; report variance between plan and field dimensions.
 4. Protection: Protect adjacent surfaces not scheduled for paint finish from damage resulting from painting operations.
 5. Surface Preparation: Allow paving to cure for 30 days minimum before pavement marking. Sweep and clean surface to eliminate loose material and dust.
- B. INSTALLATION:
1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 2. Precast Concrete Bumpers: Install with anchors as shown; do not damage bumpers or asphalt concrete paving.
 3. Pavement Marking:
 - a. General: Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
 - b. Application:
 1. General: Using proper masking, stencils and mechanical application equipment, apply two (2) coats of paint to clean, dry surfaces to produce pavement markings of dimensions required, to a minimum wet film thickness of 15 mils, with uniform, straight edges.
 2. Parking and Traffic Control Markings:
 - a) General: Conform to CalTrans Standard Specifications - Chapter 6, Markings, and jurisdictional requirements. Provide minimum of two coats paint.
 - b) Traffic Striping: 4 inch line width unless otherwise indicated, with uniform, straight edges without overspray.
 - c) Traffic Directional Markings and Accessibility Logo: Provide reflective material in traffic directional markings if required by jurisdictional authority.
 - d) Curbs: Per jurisdictional requirements, paint full vertical face and first 6-inches of horizontal plane at top of curb or combination curb/paving.
 - e) Hatching: Provide hatching in parking areas, including accessible parking stalls, as shown or as required.
 - f) Standard and Compact Stall Markings: Marking styles and widths as shown.
 - g) Accessible Stalls and Path of Travel:
 - 1) General: Per CBC.
 - 2) Painted Lines and Markings: ISA parking symbol in each indicated accessible parking stall per ANSI A117.1. Lines 3-inches wide minimum; color No. 15090 per Federal Standard 595B.
 - 3) Tactile Warning Lines: Per CBC at accessible stalls and path of travel.
 - 4) Abrasive Grit: Broadcast uniformly into wet pavement markings rate of 25 pounds per 100 square feet and repaint line.
 4. Tactile Warning Tile: Install with anchors and sealant as shown.

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PLANTING IRRIGATION

Section 32 84 00

1. GENERAL:

- A. SUMMARY: Provide Planting Irrigation, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. California State Industrial Accident Commission (CSIAC): Trench Construction Safety Orders.
- C. SUBMITTALS:
 - 1. General: Submit product data, shop drawings, samples and test reports.
 - 2. Closeout:
 - a. General: Submit maintenance.
 - b. Operating Equipment and Extra Stock:
 - 1. Sprinkler Heads: Provide prior to acceptance an amount equal to 5% of total number of each type used.
 - 2. Marker Locator: Provide manufacturer's standard locating device.
 - 3. Other Equipment: Provide two (2) keys per automatic controller; provide one (1) each for other required keys.
 - c. Record Documents:
 - 1. General: Provide manufacturer's manuals for equipment.
 - 2. Deviations: Record any changes to system, including locations, sizes, or arrangements.
 - 3. Location of Concealed Work: Locate irrigation lines, control wire routing, gate valves, remote control valves, quick coupling valves, points of connection, and other parts of system accurately to scale and dimension from two permanent points of reference.
 - d. Guarantee: Provide in required form for a period of one (1) year from date of final acceptance by City. Guarantee shall also cover repair of damage to any part of the premises resulting from leaks, trench settlements or other defects in material, equipment and workmanship, to the satisfaction of the Architect. Repairs, if required, shall be done promptly at no cost to the City upon notification by the Architect.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum four (4) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Underground Sprinkler System:
 - a. General: Irrigation System products manufactured by Rain Bird Sales, Inc., unless otherwise noted.
 - b. Alternate Manufacturers: Comparable products manufactured by the Toro Company or accepted equal.
 - c. Sprinkler Heads:
 - 1. Pop-up Spray Heads: Rainbird 1812 bodies with nozzles per plans or Hunter Institutional bodies with MP-Rotator nozzles
 - 2. Bubblers: Rainbird 1400 Series and Hunter RZWS series
 - d. Controller:
 - 1. General: ESP Series Controller automatic low voltage system with timer and transformer, type as shown.
 - 2. Remote Control Wire:
 - a) General: 600 volt AC copper, Type UF-AWG, approved for direct burial.
 - b) Color:
 - 1) Pilot Wires: No. 14 black for primary controller; additional color for each additional controller.
 - 2) Common Wires: No. 12 white.
 - 2. Pipe:
 - a. Pressure Pipe: ASTM B88, Type L, seamless copper tube, ASTM D1785, Schedule 40 PVC and UVR PVC, where shown.
 - b. Circuit Pipe:
 - 1. General: PVC, ASTM D1785, Schedule 40 and UVR PVC, where shown.
 - 2. Fittings: Threaded or solvent weldable per ASTM D2466 PVC-I.
 - 3. Solvent Cement: Compatible with PVC pipe and of proper consistency.
 - 3. Valves:
 - a. General: PEB Series; size as shown.
 - b. Manual: Cast bronze; size as shown.
 - c. Master Valve: Griswold cast bronze; size as shown.
 - d. Ball Valve: Nibco cast bronze; size as shown.

- e. Quick Coupler Valves: Model No. 33-DLRC; size as shown.
- f. Backflow Preventer:
 - 1. General: Model No. 825-YA manufactured by Febco, a Watts Water Technology Company; double check type; size as shown.
 - 2. Alternate Manufacturers: Comparable products manufactured by the Wilkins Water Control Products Division of Zurn Industries, or accepted equal.
- 4. Locating Device:
 - a. General: 3M Dynatel Locator 2200 Series manufactured by 3M Corp., United States.
 - b. Alternate Manufacturers: No known equal.
- 5. Valve Box: VB Series; size and type as shown, with locking lid.

3. EXECUTION:

A. PREPARATION:

- 1. Scheduling: Notify the Project Inspector prior to start of work and/or continuance of work in this Section. If Contractor should start work or continue work and fail to notify the Project Inspector, work shall be removed and replaced by Contractor at no cost to City.
- 2. Storage: Keep PVC pipe flat during delivery and storage. Protect from exposure to sun. Cap openings against entry by foreign matter.
- 3. Protection: Maintain warning signs, shoring and barricades as required. Prevent injury to, or defacement of, existing improvements. At Contractor's expense, repair or replace items damaged from installation operations.
- 4. Surface Preparation: Prior to starting sprinkler irrigation work, placement of topsoil as specified in Section 31 20 10 - EARTHWORK must be completed.

B. INSTALLATION:

- 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- 2. Layout: Lay out work as accurately as possible to drawings. Drawings are generally diagrammatic to the extent that swing joints, offsets, and fittings are not shown.
- 3. Workmanship:
 - a. General: Install sprinkler irrigation equipment in planted areas throughout the site.
 - b. Coverage: Provide complete coverage of irrigated areas to satisfaction of Architect; make necessary minor adjustments to suit field conditions at no additional costs to City.
 - c. Coordination: Organize location of sleeves with other trades as required.
- 4. Excavating, Trenching and Backfill: Per Section 31 20 10 - EARTHWORK.
- 5. Pipe Assembly:
 - a. General: Pipe may be assembled and welded on surface. Snake pipe from side to side of trench to allow for expansion and contraction.
 - b. Thrust Block: Provide concrete thrust blocks and anchorage for valves and fittings per pipe manufacturer's instructions.
 - c. Sleeving: Sleeve irrigation piping and wiring conduits that pass through concrete or masonry elements with schedule 40 PVC pipe.
- 6. Valves: Install as shown.
- 7. Valve Box: As shown; locations are diagrammatic. Verify in field.
- 8. Locating Devices: Install 6 inches below finish grade and 1'-0" north of valve box.
- 9. Sprinkler Heads: Install as shown, perpendicular to finish grade.
- 10. Flushing Lines: Thoroughly flush lines and prove clean prior to installing valves, performing hydrostatic testing, or installing sprinklers.
- 11. Control System:
 - a. General: Connect automatic control valves to controller in sequence as shown.
 - b. Automatic Control Valves: Install where shown and where practical; place no closer than 12 inches to walk edges, building walls, or fences.
 - c. Control Wiring: Install control wires beneath sprinkler main line whenever possible; tape wires to mainline pipe. Provide 18 inches of slack wire for each wire connected to the automatic control valve. Remote control wire splices allowed in valve boxes only. Crimp wires together with approved connector. Seal connection with approved sealing pack.
 - d. Controller: Install where shown.
- 12. Sleeving: Sleeve all irrigation piping and wiring conduits that pass under hardscape elements (and as directed by City) with Sch. 40 PVC pipe.

C. FIELD QUALITY CONTROL:

- 1. General: Notify Architect at least 48 hours in advance of testing.
- 2. Hydrostatic Testing:
 - a. General: Center load piping with small amount of backfill to prevent arching or slipping under pressure. Apply continuous static water pressure of 125 psi when welded plastic joints have cured at least 24 hours and with risers capped as follows:
 - b. Main Lines and Submains: Test at 125 psi for four (4) hours.
 - c. Branch Lines: Test at 100 psi for two (2) hours.

- d. Repairs: Fix leaks resulting from tests.
 - 3. Coverage Test: Perform to the satisfaction of Architect and City; make adjustments as required.
 - 4. Continuity Testing: Test locating device and control wires for continuity prior to and after backfilling.
- D. ADJUSTMENTS AND MAINTENANCE:
- 1. Adjusting System: Prior to acceptance, satisfactorily adjust and regulate entire system. Set watering schedule on controller appropriate to types of plants and season of year. Adjust remote control valves to operate sprinkler heads at optimum performance based on pressure and simultaneous demands through supply lines.
 - 2. Coverage Test: Contractor shall perform to the satisfaction of Architect and City. Make adjustments s required.
 - 3. System Layout: Provide reduced prints of record document irrigation plans, laminated in 4 mil plastic, of size to fit controller door. Enlarge remote control valve designations as necessary for legibility. Color code areas covered by each station. Affix plans to inside of controller door.
 - 4. Instructions: Upon completion of work, instruct maintenance personnel on operation and maintenance procedures for entire system.

* * *

TREES, PLANTS AND GROUND COVER

Section 32 93 10

1. GENERAL:

A. SUMMARY:

1. General: Provide Trees, Plants and Ground Cover, as shown and specified per Contract Documents.
2. Work Included:
 - a. Preparation of lightweight potting soil.
 - b. Trees, plants, and ground cover.
 - c. Mulch and fertilizer.
3. Related Work:
 - a. Earthwork: Refer to Section 31 20 10 - EARTHWORK.
 - b. Landscape Maintenance: Refer to Section 32 01 33 - LANDSCAPE MAINTENANCE.
 - c. Irrigation: Refer to Section 32 84 00 - PLANTING IRRIGATION.

B. REFERENCES:

1. American National Standards Institute (ANSI): ANSI Z60.1 - American Standard for Nursery Stock.
2. American Nursery and Landscape Association (ANLA): Standards.
3. Federal Specifications (FS): FS O-F-241 - Fertilizers, Mixed, Commercial.

C. DEFINITIONS: Plants: Living trees, plants, and ground cover specified in this Section.

D. OPERATION AND MAINTENANCE DATA:

1. Submit instructions for continuing City maintenance under provisions of Section 01 77 00 - CLOSEOUT PROCEDURES.
2. Include cutting and trimming methods; types, application frequency, and recommended coverage of fertilizer.

E. QUALITY ASSURANCE:

1. Nursery: Company specializing in growing and cultivating the plants specified in this Section with minimum five years documented experience.
2. Installer: Company specializing in installing and planting the plants specified in this Section with minimum five years documented experience.
3. Document that all plant materials are available. Materials are subject to inspection by Landscape Architect after confirmation of ordering.
4. Materials are subject to inspection by Landscape Architect at place of growth and upon delivery, for conformity to specifications. Inspection, approval and rejection can also take place at other times during progress of Work.
5. Request in writing, inspection of plant material at place of growth. Identify place of growth, and quantity of plants to be inspected. Inspection may be postponed at City's option.

F. REGULATORY REQUIREMENTS:

1. Comply with regulatory requirements for fertilizer and herbicide composition.
2. Plant Materials: Certified by state department of agriculture.

G. DELIVERY, STORAGE, AND HANDLING:

1. Deliver products to site under provisions of Section 01 60 00 - PRODUCT REQUIREMENTS.
2. Store and protect products under provisions of Section 01 60 00 - PRODUCT REQUIREMENTS. Store plants in an isolated area, sensitive to the shade/sun requirements of the plants and protect from weather.
3. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
4. Protect plants until planted. Protect during delivery to prevent root ball damage or desiccation of leaves.
5. Deliver plant materials immediately prior to placement. Keep plants moist. Maintain and protect material not to be planted within 4 hours, in a healthy, vigorous condition.
6. Notify City 7 calendar days in advance of delivery of plant materials and submit itemization of plants in each delivery.
7. Plants delivered to project site are to have legible identification labels. Label trees, evergreens, bundles of containers or like shrubs, and groundcover plants. State correct plant name and size indicated on plant list. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 days.

H. ENVIRONMENTAL REQUIREMENTS:

1. Do not install plant life when ambient temperatures may drop below 35 degrees F or above 90 degrees F.
2. Do not install plants when wind velocity exceeds 30 mph.

I. SEQUENCING AND SCHEDULING:

1. Coordinate the work of this Section with installation of underground irrigation system, utilities, piping and watering heads.

2. Install trees, shrubs, and liner stock plant materials before hydraulic seeding is commenced.
- J. WARRANTY:
1. Provide a warranty on work of this Section for a minimum one year including one continuous growing season. Commence warranty on date identified in the Certificate of Substantial Completion.
 2. Warranty: Include coverage of plants from death or unhealthy conditions.
 3. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

2. PRODUCTS:

A. NURSERIES:

1. Norman's Nursery.
2. Tree of Life Nursery.
3. Village Nurseries.
4. Substitutions: Under provisions of Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. MATERIALS:

1. Trees, Plants, and Ground Cover:
 - a. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.
 - b. Provide plant materials in accordance with State Department of Agriculture's regulation for nursery inspections, rules, and ratings. Provide plants with a normal habit of growth, sound, healthy, vigorous and free from insect infestations, plant diseases, sunscalds, and other disfigurements.
 - c. Ensure tree trunks are sturdy and have well hardened systems and vigorous and fibrous root systems which are not root or pot-bound. In event of disagreement as to condition of root system, the root conditions of the furnished plants in containers will be determined by removal of earth from the roots on not less than two plants, or more than two percent of the total number of plants of each specie or variety. Where container-grown plants are from more than one source, roots of not less than two plants of each species or variety from each source will be inspected. In event that the sample plants inspected are found to be defective, the entire lot or lots of plants represented by the defective samples may be rejected. Plants rendered unsuitable for planting due to this inspection will be considered samples and will be provided at no cost to City.
 - d. Size of plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on drawings. The minimum acceptable size of plants measured before pruning with the branches in the normal position, must conform with the measurements specified in the plant list. If City approved, larger size plants may be used, but without additional cost. If larger sizes are approved for use, the ball of earth or spread of roots for each plant will be increased proportionately.
 - e. Plants not meeting these specifications are considered to be defective whether in place or not. They must be immediately removed and replaced with new acceptable and approved plants of the required size, species, and variety at no additional cost. F. Do not prune, trim, top or alter the shape of trees or plants except as approved.
 - f. Provide plant materials true to botanical and common name and variety as specified in Annotated Checklist of Woody Ornamental Plants in California, Oregon, and Washington, published by University of California School of Agriculture, latest edition.
 - g. Nursery grown and collected stock: Grow under climactic conditions similar to those in locality of project. Use only liner stock plant materials well established in removable containers or formed homogeneous soil sections.
2. Soil Materials:
 - a. Imported Amended Lightweight Potting Soil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.
 - b. Ensure that silt plus clay content of soil does not exceed 20 percent by weight, with a minimum 95 percent passing the 2.0 mm sieve. Do not allow the sodium absorption ratio (SAR) to exceed 6. The electrical conductivity (ECE) of the saturation extract cannot exceed 3.0 millimohs per centimeter at 25 degrees C. Ensure that boron content is less than 1 part per million as measured on the saturation extract.
3. Soil Amendment Materials:
 - a. Fertilizer: FS O-F-241, Type I, Grade A; with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis.
 - b. Organic Amendment:
 1. Nitrogen stabilized: 0.56 to 0.84 percent N based on dry weight for wood residual or rice hulls.

- passing 2.33 mm standard sieve.
- 3. Salinity: Ensure that saturation extract conductivity does not exceed 3.5 millimohs per centimeter at 25 degrees C as determined by saturation extract method.
- 4. Iron content: Minimum 0.08 percent dilutes acid soluble Fe on dry weight basis.
- 5. Ash: 0 to 6 percent (dry weight).
- c. Soil Sulfur: Agricultural grade sulfur containing minimum of 99 percent sulfur (expressed as elemental).
- d. Iron Sulfate: 20 percent iron (expressed as metallic iron), derived from ferric and ferrous sulfate, 10 percent sulfur (expressed as elemental).
- e. Calcium Carbonate: 95 percent lime as derived from oyster shells.
- f. Gypsum: Agricultural grade product containing 98 percent minimum calcium sulphate.
- g. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight; 4 to 5 pH range; moisture content of 30 percent.
- h. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- i. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.
- j. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.
- 4. Mulch Materials: Mulching Material: wood shavings, free of growth or germination inhibiting ingredients.
- 5. Accessories:
 - a. Wrapping Materials: Burlap.
 - b. Tree Stakes: Lodge pole pine, full treated with Coppernapthanate Wood Preservative, FS TT-W-572, Type I, Composition B, 2 inch diameter, 10 feet long, no splits.
 - c. Ties: Provide 36 inch corded rubber tie as manufactured by Gro-Strait Products; wire and hose ties by Nunes Turfgrass; rigid tie stock 24 inches as manufactured by VIT Company.
 - d. Steel Guy Anchors: Provide 3/4 inch diameter by 36 inch steel vane as manufactured by Maxwell Steel Company.
 - e. Guying Hardware: Wire-liable 9 gage galvanized; hose-1/2 inch new rubber; turnbuckles-galvanized or dip painted; cable clamps-galvanized; safety sleeve-1/2 inch white pvc full length of wire; sizes as required.
 - f. Tree Paint: Morrison Tree Seal, or Cabort Tree Paint.
 - g. Sand: Provide washed and dried silica sand.
- C. SOURCE QUALITY CONTROL: Provide inspection for verifying acceptability of plants.

3. EXECUTION:

- A. EXAMINATION
 - 1. Verify that prepared lightweight potting soil and planters are ready to receive work of this Section.
 - 2. Saturate soil with water to test drainage.
 - 3. Verify that required underground utilities are available, in proper location, and ready for use.
 - 4. Beginning installation means acceptance of existing conditions.
- B. PREPARATION OF SUBSOIL:
 - 1. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
 - 2. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
 - 3. Dig pits and beds 6 inches larger than plant root system.
- C. PLACING LIGHTWEIGHT POTTING SOIL:
 - 1. Spread lightweight potting soil over area to be planted. Rake smooth.
 - 2. Place soil during dry weather and on dry subgrade.
 - 3. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
 - 4. Grade lightweight potting soil to eliminate rough, low, or soft areas, and to ensure positive drainage.
 - 5. Install soil mixture in pits and beds intended for plant root balls, to a minimum thickness as indicated on Drawings.
- D. FERTILIZING:
 - 1. Apply fertilizer in accordance with manufacturer's instructions.
 - 2. Apply after initial raking of topsoil.
 - 3. Mix thoroughly into upper 2 inches of topsoil.
 - 4. Lightly water to aid the dissipation of fertilizer.
- E. PLANTING:
 - 1. Place plants for best appearance for review and final orientation by Landscape Architect. Typically, face plants with fullest growth into prevailing winds.
 - 2. Set plants vertical.

4. Set plants in pits or beds, partly filled with prepared topsoil mixture.
 5. Backfill container plants with:
 - 6 parts by volume on-site soil
 - 4 parts by volume organic amendment
 - 1 pound 6-20-20 fertilizer mix/cu yd of mix
 - 2 pounds iron sulfate per cu yd of mix
 6. Raise all plants which settle deeper than the surrounding grade. After plant has been placed, add sufficient backfill to hole to cover approximately 1/2 of root ball. Add water to the top and thoroughly saturate root ball and adjacent soil.
 7. Remove bottom of plant boxes before planting.
 8. After water has completely drained, place planting tablets:
 - a. 1 tablet per 1-gallon container.
 - b. 2 tablets per 5-gallon container.
 - c. 3 tablets per 15-gallon container.
 - d. 4 tablets per 24 inch box.
 - e. 5 tablets per 30 inch box.
 - f. 6 tablets per 36 inch box.
 - g. 7 tablets per 42 inch box.
 - h. 8 tablets per 48 inch and larger boxes.Set planting tablets with each plant, on top of root ball, while plants are still in their containers so the required number of tablets can be verified.
 9. Backfill the remainder of hole and tamp firm. Construct an earthen basin around each plant after backfilling. Provide basin of depth sufficient to hold at least 2 inches of water. Construct basins with amended backfill. Remove basin in all turf areas after initial watering.
 10. Green Roof Planting: Plants shall be 'pre-planted' in trays and grown off-site for a period of no less than six (6) months prior to installation on-site. Contractor to provide progress photos at time of planting and at 1-month intervals until installation. Unsatisfactory growth shall result in Contractor providing more mature plant material in order to provide more satisfactory coverage, at no additional cost to City.
- F. FIELD QUALITY CONTROL:
1. Field inspection will be performed under provisions of Section 01 43 00 - QUALITY ASSURANCE.
 2. Notify City and Landscape Architect in advance for the following inspections, according to the times specified:
 - a. Pre-job conference - 7 calendar days.
 - b. Final grade review - 48 hours.
 - c. Plant material review - 48 hours.
 - d. Plant layout review - 48 hours.
 - e. Soil preparation and planting operations; one tree with each type of specified staking - 48 hours.
 - f. Pre-maintenance - 7 calendar days.
 - g. Final inspection - 7 calendar days.

* End Division 32 *

Division 33 - UTILITIES

SITE UTILITY SERVICES

Section 33 00 10

1. GENERAL:

- A. SUMMARY: Provide Site Utility Services, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. General: Perform Work in accordance with jurisdictional agency and utility company standards and requirements.
 - 2. American Public Works Association (APWA): Standard Specifications for Public Works Construction.
 - 3. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 4. American Welding Society (AWS): Welding Standards.
 - 5. American Water Works Association (AWWA): Standards.
 - 6. State of California, Department of Transportation (CalTrans): CalTRANS Standard Specifications.
 - 7. California State Industrial Accident Commission (CSIAC): Trench Construction Safety Orders.
 - 8. National Fire Protection Association (NFPA): NFPA 13 - Installation of Sprinkler Systems.
 - 9. Intertek Testing Services (ITS): Standards.
 - 10. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory and Building Material Directory.
 - 11. City of San Diego Approved Materials List.
 - 12. Standard Specifications for Public Works Construction.
 - 13. City of San Diego Standard Drawings for Public Works Construction.
- C. SUBMITTALS:
 - 1. General: Submit product data.
 - 2. Certificates: Submit certificate in lieu of manufacturer's name and pressure rating marked on valve body of valves and gas cocks, as required.
 - 3. Closeout: Submit maintenance data and guarantee in required form for a period of one (1) year from date of final acceptance by Owner.
- D. QUALITY ASSURANCE: Welders to be AWS certified.

2. PRODUCTS:

- A. MATERIALS:
 - 1. Piping:
 - a. General: Refer to Division 22 - PLUMBING for detailed pipe and fitting requirements.
 - b. Sanitary Sewer:
 - 1. Outside Property Line: Per applicable utility service regulations and standards.
 - 2. Within Property: As shown.
 - c. Water:
 - 1. To Meter and Detector Check: Per applicable utility service regulations and standards.
 - 2. Potable Water from Meter: As shown.
 - 3. Meter: Per jurisdictional requirements.
 - d. Natural Gas:
 - 1. To Meter: Per applicable utility service regulations and standards.
 - 2. From Meter: Black steel; buttweld; wrapped and coated.
 - 2. Valves:
 - a. General: Outside property line, conform to applicable utility service regulations and standards.
 - b. Water:
 - 1. General: Per AWWA Standards.
 - 2. Fire Protection: Per UL and FM Standards.
 - c. Gas: Per AWWA Standards.
 - d. Valve Boxes: As detailed. Precast concrete boxes with extensions and cast iron frame and cover. Cover marked "Water" or "Gas" applicable to valve.
 - 3. Electrical and Communications Service:
 - a. Outside Property Line: Per applicable utility service regulations and standards.
 - b. Within Property: Refer Division 26 - ELECTRICAL.
 - 4. Bedding Materials: Refer to Section 31 20 10 - EARTHWORK.
 - 5. Landscape Irrigation System: Per Section 32 84 00 - PLANTING IRRIGATION.

3. EXECUTION:

A. PREPARATION:

1. Scheduling: Coordinate off-site service connections and connections within the building line with the work of this Section.
2. Examination: Examine conditions of work in place before beginning work; report defects.
3. Protection: Conform to "Trench Construction Safety Orders", California State Industrial Accident Commission.

B. INSTALLATION:

1. General: Install in conformance with jurisdictional, utility and referenced standards, as shown, and as specified.

* End Division 33 *

33 to 49 NOT USED

NOT USED

* End Division 49 *

SUPPLEMENTARY SPECIAL PROVISIONS

APPENDICES

APPENDIX A
REMEDIAL ACTION AND PROPERTY MIGRATION PLAN

Advantage Environmental Consultants, LLC

REMEDIAL ACTION AND PROPERTY MITIGATION PLAN

Fire Station No. 2 (Bayside)
1595 Pacific Highway
San Diego, California 92101

AEC Project No. 10-069SD
July 29, 2011

Presented to:

County of San Diego Department of Environmental Health
Site Assessment and Mitigation Program
5500 Overland Avenue, Suite 110
San Diego, California 92123

On Behalf Of:

Centre City Development Corporation
401 B Street, Suite 400
San Diego, California 92101

and

The City of San Diego Real Estate Assets Department
1200 Third Avenue
San Diego, California 92101

Prepared by:

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Phone (760) 744-3363 • FAX (760) 744-3383

Remedial Action and Property Mitigation Plan

**Fire Station No. 2 (Bayside)
1595 Pacific Highway
San Diego, California 92101**

Advantage Environmental Consultants, LLC has prepared a Remedial Action and Property Mitigation Plan (PMP) for the above referenced property which is being submitted to the County of San Diego Department of Environmental Health for review, comment and approval. This PMP was completed in accordance with the standards of care exercised by environmental professionals in the industry and under the technical direction of the undersigned. The plan is being submitted concurrently with a Voluntary Assistance Program application for the project and has also been drafted to address DEH requirements for site assessment under Local Oversight Program Case #H23307-002.



Michael J. Faulkner, PG
Project Geologist
California PG# 8716



Dan Weis, R.E.H.S., REA
Branch Manager
Western Regional Office

7/29/2011

Date

7/29/11

Date

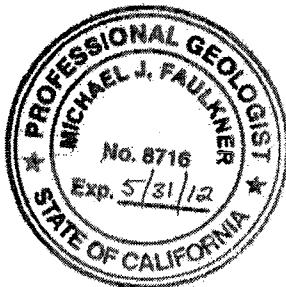


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APPENDIX

APPENDIX A	COMMUNITY HEALTH AND SAFETY PLAN
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1.0 INTRODUCTION

On behalf of Centre City Development Corporation (CCDC) and the City of San Diego, Advantage Environmental Consultants, LLC (AEC) has prepared this Remedial Action and Property Mitigation Plan (PMP) for review by the County of San Diego Department of Environmental Health (DEH) Site Assessment and Mitigation Program (SAM). This PMP presents a work plan to conduct contaminated soil segregation and management activities during redevelopment of the 10,000 square-foot proposed Fire Station No. 2 (Bayside) property identified by the legal address of 1595 Pacific Highway, San Diego, California (i.e. the "Site"). The Site is further identified by County of San Diego Assessor's Parcel Numbers (APN) 533-321-01-00 and 533-321-02-00, and as Lots 1 and 2 in Block 288 of Middletown, in the City of San Diego, County of San Diego, State of California.

The City of San Diego is the owner of the subject Site. It is the intention of CCDC, on behalf of the City and its Redevelopment Agency, to retain contractors to demolish existing improvements at the Site and construct a new fire station to be identified as Fire Station No. 2 (Bayside). Planned redevelopment of the Site includes construction of a three-story structure with a one level subterranean parking garage and basement. Construction activities will include the excavation, removal, and export of approximately 4,000 cubic yards (c.y.) of soil from the Site with excavation depths ranging from approximately 10 to 15 feet below existing grades. Shoring systems will be utilized for the purposes of stabilizing vertical sidewalls. Based on the proposed subterranean component for the redevelopment project and historical groundwater elevations recorded in groundwater monitoring wells located at the Site, groundwater dewatering will be required during grading operations.

Of the approximately 4,000 c.y. of soil to be displaced during construction of the basement for the proposed Site building, it is currently estimated that approximately 1,500 c.y. of such soil is impacted with lead and/or petroleum hydrocarbons and will require segregation, special handling and off-site disposal or treatment at regulated receiving facilities. More specifically, of the 1,500 c.y. of contaminated soils, lead-impacted soils are estimated at approximately 425 c.y. and hydrocarbon-impacted soils are estimated at approximately 1,075 c.y. Remaining clean soil (i.e. inert waste) will be removed from the Site under Tier 1 or Tier 2 designations as described and in accordance with San Diego Regional Water Quality Control Board (SD-RWQCB) Resolution R9-2007-0104 Conditional Waiver No. 8 requirements, which apply to the temporary stockpiling and subsequent use of soil categorized as inert waste containing metals from known contaminated properties. A Notice of Intent (NOI), Inert Waste Certification and other documents required under Conditional Waiver No. 8 will be submitted directly to the SD-RWQCB for their review.

Prior environmental assessments were conducted at the Site between 1990 and 1993, and in 2005. Based on AEC's interpretation of such data, total petroleum hydrocarbons (TPH) in the gasoline and diesel ranges and volatile organic compounds (VOCs) are considered to be the contaminants of concern (COCs) at the Site. Total lead was detected at a maximum concentration of 48.6 milligrams per kilogram (mg/kg) in artificial fill material at the Site during the 2005 subsurface assessment. This concentration does not exceed human health risk based thresholds for total lead in residential and commercial/industrial soils or waste profiling related thresholds regarding solubility of this metal as it pertains to waste profiling. As such, lead is not considered to be a COC at the Site. However, some of the lead concentrations do exceed local screening levels pertaining to off-Site reuse of soil at unregulated receiving facilities. Soil with lead concentrations exceeding reuse related screening levels, in addition to soil that is contaminated with TPH and VOCs, will require special handling and disposal during future

excavation activities. Other heavy metals and organic compounds are also not considered to be COCs for the Site at this time, but may require further evaluation as part of inert waste tracking and documentation if other metals or organic compounds of concern at the Site are revealed during the course of the project.

The estimated volume of lead-impacted soil previously discussed is anticipated to be located at three localized locations, two of the locations within the upper 0.5 foot to 2.5 feet of soil at the Site, and one of the locations in a former underground storage tank (UST) cavity from approximately 0.5 foot to 10 feet below the surface. The TPH and VOC impacted soils are interpreted to underlie approximately three-quarters of the Site, and at a minimum from groundwater elevation to generally no shallower than five feet from existing grades. Petroleum impacts to soil are also present within the former UST cavity area referenced above. TPH and VOC impacted soils beneath the Site are the result of gasoline and diesel releases likely associated with the UST system for the former gasoline service station that operated at the Site between 1940 and 1971. Up to six underground storage tanks were documented to have been previously used at the Site. Petroleum impacts are expected to reach the bottom of the proposed depths of excavation at the impacted areas at the Site based on a review of available data.

The primary objective of this PMP is to affirm the protection of human health during the proposed excavation activities, to complete petroleum hydrocarbon source removal activities within the excavation footprint, to affirm the long term health and safety of users of the Site and to affirm that there is no on-going threat to natural resources. Removal and disposal of soil containing lead above off-Site reuse related thresholds and TPH and VOCs above detectable concentrations during the proposed excavation activities at the Site will be conducted under the oversight of the County of San Diego DEH via the Voluntary Assistance Program (VAP). At the completion of the work proposed in this plan, a Closure Report will be submitted to the DEH. The Closure Report will seek closure of both the Voluntary Assistance Program (VAP) as well as the currently open Local Oversight Program (LOP) case. As stated previously, documentation required under Conditional Waiver No. 8 will be submitted directly to the SD-RWQCB for their review and concurrence.

1.1 Project Location and Description

The Site is a generally square-shaped, 10,000 square-foot lot located at 1595 Pacific Highway in San Diego, California. The Site is further identified by County of San Diego APNs 533-321-01-00 and 533-321-02-00. The 533-321-01-00 parcel is developed with a 1,937 square foot restaurant building. Other improvements at the Site include concrete and asphalt paving, landscaping, a drive-through sign, a cooling tower associated with the Site structure, a dumpster enclosure, various utility systems and other improvements. The Site is located on the southeast corner of the intersection of Pacific Highway and West Cedar Street. The city block that encompasses the Site is bound by Cedar Street (north), Beech Street (south), California Street (east) and Pacific Highway (west). Adjacent properties of the Site (excluding streets and public right-of-ways) include various commercial properties. A Vicinity Map depicting the general location of the Site is included as Figure 1. A Site Plan depicting the boundaries and current configuration of the Site is included as Figure 2.

1.2 Regulatory Status and Previous Assessment Work

The Site was previously investigated under the DEH Local Oversight Program (LOP) in the 1990s as a complaint and Case #H23307-001, with on-Site soil and groundwater fuel-related contamination discovered during the drilling of a soil boring at the Site that was associated with an investigation completed as part of an assessment of the southern adjacent property. In addition, the DEH received data via a 60-day report of information per soil boring permit guidelines in May 2009 that indicated that petroleum hydrocarbons were present in soil at the Site. As a result, the DEH closed Case #H23307-001 and Case #H23307-002 was opened by the DEH under the LOP in 2010. A 2005 Limited Phase II Environmental Site Assessment Report was forwarded by CCDC to the DEH on March 30, 2011. The 2005 report noted TPH as gasoline in soil at the Site at concentrations up to 3,800 mg/kg and benzene at up to 5.4 mg/kg in soil samples collected from depths of 10 to 11 feet below the ground surface.

Numerous environmental assessments and groundwater monitoring and sampling events were conducted at the Site between 1990 and 1993. The most recent environmental assessment at the Site was conducted in 2005. During the preparation of this PMP, AEC reviewed the following documents generated for the Site:

- *Interim Report of Site Assessment, 1595 Pacific Highway*, LeRoy Crandall & Associates, dated October 1, 1990;
- *Report of Site Assessment, 1595 Pacific Highway*, Law/Crandall, Inc., dated November 20, 1991;
- *Report of Ground Water Monitoring May – June 1992, 1595 Pacific Highway*, Law/Crandall, Inc., dated July 7, 1992;
- *Report of Ground Water Monitoring December 1992, 1595 Pacific Highway*, Law/Crandall, Inc., dated January 27, 1993;
- *Report of Ground Water Monitoring June 1993, 1595 Pacific Highway*, Law/Crandall, Inc., dated July 7, 1993;
- *Limited Phase II Environmental Site Assessment, 1595 Pacific Highway*, Ninyo & Moore, dated October 21, 2005;
- *Geotechnical and Fault Investigation, Bayside Fire Station*, Leighton & Associates, dated April 3, 2009;
- Staff Report dated April 7, 2010 for April 14, 2010 CCDC Real Estate Committee (project overview), including Centre City Development Permit Application Basic Concept/Schematic Drawings; and
- *ALTA/ACSM Land Title Survey*, RBF Consulting, dated September 21, 2005.

Based on the review of the above referenced documents, the following key points are noted:

- The Site was used for residential purposes from at least the early 1900s until approximately 1940 when the property was developed as a gasoline service station. The service station had a historical physical address of 1569 Pacific Highway.
- Up to six underground storage tanks were documented to have been previously used at the Site. Historical permits from the City of San Diego Fire Department show four of the tanks as being “abandoned” and two of the tanks as being “removed.” It is unknown at this time if the abandoned tanks were abandoned in place or physically removed from the property.

- The use of the Site as a service station ceased in the early 1970s and the property was subsequently developed for commercial purposes (restaurant).
- The October 1, 1990 Interim Site Assessment report, prepared by LeRoy Crandall and Associates, was conducted due to the discovery of contamination at the Site as part of an investigation of an adjacent property. Subsequently, the DEH required an assessment of the Site to evaluate the extent of contamination and subsequent groundwater samples obtained contained some halogenated and/or aromatic volatiles (including benzene).
- The November 20, 1991 Site Assessment report prepared by Law Crandall Inc. was conducted to supplement the interim site assessment report referenced above. Additional subsurface assessment yielded a consultant estimate that the volume of contaminated soil at the Site was approximately 1,050 cubic yards with an average concentration of petroleum hydrocarbons of 1,300 to 3,000 mg/kg. In addition, benzene, toluene, ethylbenzene and xylenes (BTEX) contamination was also revealed in groundwater beneath the Site.
- Groundwater monitoring events in 1992 and 1993 continued to yield BTEX in groundwater obtained from four groundwater monitoring wells installed on-Site. The source of such impacts was referenced as the former on-Site USTs and possibly migration of contaminants from off-Site sources (not confirmed).
- The October 21, 2005 Limited Phase II Environmental Site Assessment was conducted on behalf of CCDC to evaluate the presence of soil contamination from petroleum hydrocarbons in the vicinity of the former USTs and dispenser islands and evaluate lead in soil at the Site. In addition, the four on-Site groundwater monitoring wells (MW1-MW4) and one off-Site groundwater monitoring well (MW-9) within the median area on Pacific Highway were redeveloped, purged and sampled. Petroleum hydrocarbons and fuel related VOCs were detected in several of the soil samples, with gasoline, diesel fuel and various VOCs also detected in the groundwater samples from the on-Site wells. No TPH or BTEX compounds and only minor concentrations of other VOCs were detected in the off-Site well (MW-9) during the historical sampling events. The highest concentrations of contaminants in groundwater were found in well MW-4 which is located in the northeastern corner and most up-gradient portion of the Site. Free product has not been identified in the monitoring wells associated with the Site during historical sampling events. Lead was detected in each of the 56 soil samples analyzed for this constituent at concentrations ranging from 1.46 mg/kg to 48.6 mg/kg. The depth to water in the wells ranged from approximately 10 to 14 feet and the groundwater flow direction was interpreted to be towards the southwest.

The previous site assessment reports referenced above collectively discuss the horizontal and vertical extent of lead and petroleum hydrocarbon impacted soil and groundwater beneath the Site. Further sampling and testing will be required to implement the PMP and complete the project (i.e. for contaminated soil profiling with the selected receiving facility or facilities, inert waste tracking, interim and final confirmation soil sampling, etc.). Such protocols and methods and anticipated volumes of lead and petroleum hydrocarbon impacted soils are further discussed in the following sections of this PMP. However, no further vertical or horizontal assessment is expected to be necessary to sufficiently document the extent of contamination to close LOP Case #H23307-002 following the activities outlined in this plan.

1.3 Project Schedule

CCDC and the City of San Diego currently anticipate that this project will be bid to contractors in the last quarter of 2011 with remediation activities beginning in early 2012.

2.0 SITE CONDITIONS

2.1 Topography

Based on review of the United States Geologic Survey (USGS) 7.5-minute topographic map for the Point Loma Quadrangle (1996), regional topographic relief is depicted as generally moderate to the southwest toward the Pacific Ocean. The topographic relief in the vicinity of the Site slopes gently to the west toward San Diego Bay, and the Site is depicted as generally flat and at an elevation of approximately 20 feet above mean sea level (MSL). Site structures are not depicted on-Site on the topographic map; however, the Site is situated in an area that is shaded red, indicating dense development. Streets, roadways, and railways bordering and/or nearby the Site are shown in their current configurations. The closest water body to the Site is the San Diego Bay, located approximately 800 feet west of the Site. Figure 1 (Vicinity Map) is a reproduction of the 1996 USGS topographic map.

2.2 Geology

The Site is situated in the coastal section of the Peninsular Ranges Geomorphic Province; one of 11 physiographic provinces in California recognized by defining features based on geology, faults, topography, and climate. The Peninsular Ranges Province is dominated by a series of northwest-oriented mountain ranges extending from the Baja California peninsula in the south to the Transverse Ranges in the north. The Province is bound by the Colorado Desert Province to the east and the Pacific Ocean to the west. The series of mountain ranges are separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault System.

The coastal section of the province is underlain by a thick sequence of primarily marine and nonmarine clastic sediments eroded from the Peninsular Ranges as a result of tectonic uplift beginning in the Cretaceous Period approximately 60 million years ago. Marine standstills during transgressive-regressive cycles resulted in wave-cut abrasion platforms on the sea floor, which were later elevated above sea level as a result of Quaternary faulting and uplift. Today, these distinct, nearly flat marine terraces, or mesas, lie at different elevations throughout the western Peninsular Ranges Province, with terrace ages and elevations increasing from the coast to the east.

Based on the review of published geologic map sources (Kennedy, 1975; and Kennedy and Tan, 2008) and information obtained from prior environmental and geotechnical investigations completed at the Site, the Site appears to be underlain by undocumented fill material varying in thickness from beneath the existing parking lot asphalt concrete to approximately one to two feet below ground surface (bgs), with some deeper anomalous areas up to approximately 10 feet bgs where former underground structures (i.e. USTs) were removed. Leighton and Associates (2009) describe the undocumented fill soils as dark brown to light brown, clayey sands with abundant gravels, construction debris, and trash. A thin veneer (less than one foot) of pedogenic soils apparently underlies the undocumented fill beneath the Site, followed by a wedge of colluvium and Quaternary-age Old Paralic Deposit Unit 6 (Qop6). The colluvial soils beneath the Site reportedly thicken toward the southwest, up to eight feet along the southern boundary of the Site, and are described as light brown, moist, and loose, silty sands with abundant gravel. Old Paralic Deposit Unit 6 underlies the entire Site to an anticipated depth of at least 100 feet bgs, and consists of reddish brown and brown, fine- to medium-grained sandstone and claystones to the maximum depths explored by Leighton and Associates (2009). Kennedy and Tan (2008) describe the Old Paralic Deposit Unit 6 as poorly-sorted, moderately permeable, reddish-brown, interfingering strandline, beach, estuarine and colluvial deposits

composed of siltstone, sandstone and conglomerate. Kennedy (1975) previously mapped the old paralac deposit as the Bay Point Formation.

The Site, as with all of southern California, is considered to lie within a seismically active region. Major known active faults in the region consist generally of en-echelon, northwest striking, right-lateral, strike-slip faults. These include the Elsinore, San Jacinto, and San Andreas faults located northeast of the Site, and the San Clemente, San Diego Trough, and Agua Blanca-Coronado Bank faults located southwest of the Site. Based on the review of geologic maps by Kennedy (1975) and Kennedy and Tan (2008), two concealed fault traces associated with the active Rose Canyon Fault Zone are mapped nearby to the northeast and southwest of the Site.

2.3 Hydrology / Hydrogeology

The Site is located within the San Diego Hydrologic Basin Planning Area. According to the *Water Quality Control Plan for the San Diego Basin (9)* (California Regional Water Quality Control Board, 1994), the Site is located in the Lindbergh Hydrologic Subarea (HSA) within the San Diego Mesa Hydrologic Area of the Pueblo San Diego Hydrologic Unit. Groundwater in the Lindbergh Hydrologic Subarea (HSA) has no existing beneficial use designations and is specifically exempted from municipal use as drinking water. Regional groundwater flow is anticipated to be toward the southwest, and based the most recent groundwater data obtained at the Site during a 2009 geotechnical investigation, the depth to static groundwater beneath the Site is anticipated to be present at approximately one to 1.5 feet above mean sea level (approximately 10 to 13 feet below existing grades at the Site). As stated previously, dewatering activities will be required during the construction activities.

Surface runoff at the Site and along adjacent roadways is expected to occur as sheet flow. Surface drainage at the Site is facilitated by nearby municipal storm drains along public roadways which are maintained by the City of San Diego. The Site does not appear to receive significant drainage from off-site properties. The nearest surface water body to the Site is San Diego Bay, located approximately 800 feet to the west.

3.0 ESTIMATED DISTRIBUTION OF IMPACTED MEDIA

3.1 Soil

As previously discussed, of the approximately 4,000 c.y of soil to be displaced during construction of the basement for the proposed Site building, it is currently estimated that approximately 1,500 c.y of such soil will require segregation, special handling and off-site disposal or treatment at regulated receiving facilities. Remaining clean soil (i.e. inert waste) will be removed from the Site under Tier 1 or Tier 2 designations as described and in accordance with SD-RWQCB Resolution R9-2007-0104 Conditional Waiver No. 8 requirements, which apply to the temporary stockpiling and subsequent use of soil categorized as inert waste containing metals from known contaminated properties. A NOI, Inert Waste Certification and other documents required under Conditional Waiver No. 8 will be submitted directly to the SD-RWQCB for their review. A Site plan with the alphanumeric grid designation to be used during the oversight of the remedial work is included as Figure 3.

Petroleum Hydrocarbon Impacted Soil

Releases of petroleum hydrocarbons have impacted vadose, capillary and saturated zone soils beneath the Site, at a minimum from groundwater elevation to generally no shallower than five feet from existing grades, throughout approximately three-quarters of the Site. This PMP proposes the removal of petroleum hydrocarbon impacted soil within the excavation footprint to a maximum depth of approximately 15 feet bgs. The petroleum hydrocarbon impacted soil will likely be profiled as a non-hazardous waste and all petroleum impacted soil will be disposed of at off-Site, permitted regulated receiving facilities. At this time, it is anticipated that approximately 1,075 cubic yards of petroleum hydrocarbon impacted soil will be excavated during the proposed excavation and remedial activities. Petroleum impacts are expected to reach the bottom of the proposed depths of excavation at the impacted areas at the Site based on a review of available data. A Site Plan with the estimated limits of petroleum hydrocarbon impacted soils is included as Figure 4.

Lead Impacted Soil

As stated previously, based on information obtained from prior environmental studies completed at the Site, the Site is underlain by undocumented fill material at generally shallow depths with some deeper anomalous areas identified during prior assessment activities, followed by the colluvium and Old Paralac Deposit Unit 6 (Bay Point Formation). Such fill material has been found to contain lead above typical background/naturally occurring concentrations. Based on available total lead data, we anticipate the lead-impacted soil will likely be profiled as a non-hazardous waste. Within the excavation footprint, lead-impacted soil will be excavated, stockpiled and sampled and then either removed from the Site as a regulated waste to off-Site permitted receiving facilities, or as inert waste employing the criteria set forth in the SD-RWQCB Resolution R9-2007-0104 (Conditional Waiver No. 8.II.E). At this time, it is anticipated that approximately 425 cubic yards of lead impacted soil will be excavated during the remedial work. A Site plan with the estimated limits of lead-impacted soils is included as Figure 5.

3.2 Potential Receiving Facilities

Potential landfill/recycling facilities to receive soil removed from the Site as a regulated waste are yet to be determined. Final decisions pertaining to the use of such facilities will be made closer to the time of the commencement of excavation. However, all impacted soil will be delivered to appropriate receiving facilities and the locations of such facilities will be provided in the Closure Report for the project. As stated previously, inert waste removed from the Site will be conducted under SD-RWQCB Resolution R9-2007-0104 Conditional Waiver No. 8. The implementation of Conditional Waiver No. 8 will be overseen directly by the SD-RWQCB.

4.0 PROPOSED MITIGATION

4.1 Groundwater Monitoring Well Sampling and Destruction

Well Sampling

Prior to demolition activities to be completed at the Site, the four on-Site groundwater monitoring wells and one off-Site groundwater monitoring well will be purged and sampled in accordance with DEH SAM manual guidelines. The new groundwater analytical data will be utilized to complete a human health risk assessment using the DEH Vapor Risk 2000 Model for Subsurface Vapor Intrusion into Buildings. The groundwater monitoring well sampling will be completed as follows:

- Check for free product and measure the depth to groundwater in the wells.
- Purge and sample the monitoring wells in accordance with SAM manual guidelines using either a peristaltic pump or disposable bailers.
- Following purging activities, collect groundwater samples using new and dedicated disposable polyethylene bailers. The groundwater samples will be placed in laboratory provided sample containers and placed in a chilled cooler for transport to the laboratory for analysis.
- QA/QC procedures to be used during the groundwater sampling will include using equipment that is either dedicated or that has been cleaned in a non-phosphate solution followed by successive rinses in drinking water prior to purging and sampling the well. Chain-of-custody documentation will be provided for each groundwater sample transferred to the laboratory.
- The groundwater samples collected will be analyzed for TPH by United States Environmental Protection Agency (EPA) test Method 8015B and for VOCs by EPA method 8260B.
- Purged groundwater generated during the sampling activities will be placed into Department of Transportation (DOT)-approved steel 55-gallon drums and stored on-Site pending analytical results. The drums will be profiled, transported and disposed of at a regulated receiving facility by an appropriate vendor licensed to handle such waste.
- If the results of the human health risk assessment suggest that a vapor barrier is required at the Site, CCDC, CCDC's environmental consultant, the City of San Diego and the selected contractor will implement any necessary mitigation measures.

Well Destruction

Prior to mass excavation activities being conducted at the Site, permits will be procured with the County of San Diego DEH for the destruction of the four on-Site groundwater monitoring wells (MW1 through MW4). It is unknown at this time if the off-Site groundwater monitoring well MW-9 within the median area of Pacific Highway will also be destroyed. The future disposition of this well along with the results of the groundwater monitoring well sampling to be completed will be discussed with the DEH prior to the well destruction activities. The well destructions will be

completed using a truck-mounted drill rig equipped with hollow stem augers. The well box and casing of each groundwater monitoring well to be destroyed will be removed and the wells will then be over-drilled to the total depth of each well to ensure that all the annulus material is removed. Each boring will then be backfilled with bentonite amended Portland cement. Well materials displaced during the overdrilling/abandonment activities will be placed in to DOT approved 55-gallon drums or a roll off bin and disposed of at a licensed receiving facility under proper manifesting protocol. A report of the well destruction activities will be submitted to the DEH.

4.2 Remedial Excavation General Approach and Methodology

The California Water Code and Titles 23 and 27 of the California Code of Regulations dictate that soil with detectable concentrations of hazardous substances or petroleum products above interpreted background levels are considered to be "waste" following excavation. Any waste is required to be transported to an appropriate waste management facility and be treated, stored, or disposed, and/or reused on-site or off-site in accordance with applicable local, state, and federal regulations. During the implementation of this PMP, soil displaced by the excavation contractor during the construction activities will be segregated, stockpiled, sampled and either shipped to regulated receiving facilities or reused off-site at other receiving sites under SD-RWQCB Resolution R9-2007-0104 Conditional Waiver No. 8. During the excavation activities, contaminated soil will be removed using excavators, backhoes, loaders and/or other conventional equipment and placed onto trucks for off-site disposal under appropriate manifests. Inert waste will also be removed in a similar manner and will be tracked by bills of lading. Conventional shoring systems will be utilized for the purposes of stabilizing vertical sidewalls along the perimeter of the excavation footprint. Dewatering activities will also be performed as-needed by the contractor. All groundwater generated as a result of dewatering activities that is discharged will be treated to meet applicable regulatory criteria, which include the San Diego Regional Water Quality Control Board (storm drain) or the City of San Diego Metropolitan Wastewater Department (sewer). The selected dewatering discharge point will in part be dependent on the groundwater influx in to the excavation.

It should be noted that there are other alternatives for the management of impacted soil to be displaced during the proposed construction activities at the Site. Such alternatives include:

- Reuse of impacted soils on-Site;
- In situ treatment;
- Ex situ on-Site treatment; and
- No action.

Each remedial alternative was evaluated with respect to effectiveness, feasibility, and cost. On-Site reuse of contaminated soil is not a feasible alternative due to spatial constraints at the Site and also the relatively shallow depth to groundwater. In situ or ex situ treatment is difficult to achieve with soil that is impacted with metals, takes excessive time to design and implement (i.e. procuring permits and monitoring), and would likely take longer than the redevelopment schedule allows. Taking no action is also not a viable alternative as redevelopment plans and the building design require the excavation work to be completed which will result in the contaminated soil being displaced and exported off-site.

Environmental professionals working under the oversight of a California Professional Geologist will be present at all times during on-Site excavation activities conducted during the course of the project. Monitoring and oversight of inert waste removal will be conducted in accordance

with SD-RWQCB Resolution R9-2007-0104 Conditional Waiver No. 8. Personnel responsible for and involved in the implementation of this PMP will be thoroughly knowledgeable and experienced in the various aspects of the work to be completed. This knowledge and experience will include, but not be limited to, familiarity with the Site geologic and hydrogeologic conditions, laboratory data review and verification, Site physical conditions and access, Site personnel and contacts and Site health and safety rules, procedures, and protocols. Field personnel will have 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and current 8-hour annual refresher training in accordance with 29 Code of Federal Regulations 1910.120 [Title 8 California Code of Regulations 5192]. Site field work will also be conducted in accordance with a Site-specific, worker health and safety plan. In addition, employees of the excavation contractor retained for this project who will be in contact with contaminated soil will have the proper 40-hour HAZWOPER training. The excavation contractor will also hold a Class A, Engineering Contractor's license with a Hazardous Substance Removal Certification (HAZ) issued by the State of California. Health and safety monitoring will also be performed. The lead contractor and other consultants on the project, which may include testing and inspection, paleontological, archeological, etc., may also rely on health and safety related monitoring data, although the contractor and other consultants will be ultimately responsible for the training and health and safety of their own workers and employees.

4.2.1 Strategy for Export of Impacted Soils

Grading activities will involve the removal of shallow soil that contains lead at levels of greater than 15 mg/kg (Tier 1 Soil Screening Level (SSL) for lead as published in SD-RWQCB Resolution R9-2007-0104 Conditional Waiver No. 8)) and detectable concentrations of TPH and/or VOCs. Tier 1 SSLs for other metals may also be utilized for this purpose depending on the results of waste profiling activities. The excavation of soil will proceed in approximately five-foot vertical lifts to the total depths of excavation as designated by the construction plans for the proposed parking structure. Soil from each lift will either be stockpiled based on visual and olfactory observations, photo-ionization detector (PID) screening for undifferentiated VOCs, X-ray fluorescence field screening for lead, stationary and/or mobile analytical laboratory sample analysis, and/or professional judgment; or loaded directly onto trucks for offsite disposal in areas of obvious contamination and/or areas where no soil impacts are evident.

When soil is temporarily stockpiled during soil management activities, it will be sampled in accordance with sample frequency guidelines as specified by the selected regulated receiving facility or facilities (contaminated soil) and/or requirements as specified in SD-RWQCB Resolution R9-2007-0104 (Conditional Waiver No. 8) for the inert waste. Sampling requirements under the referenced inert waste waiver are as follows.

- 0 to <500 cubic yards - 4 samples per 100 cubic yards
- 500 to <5,000 cubic yards - 1 additional sample per additional 500 cubic yards
- 5,000 cubic yards or more - 1 additional sample per additional 1,000 cubic yards

Different colored flags will be used to designate stockpiles as undergoing laboratory analysis, inert or contaminated. Statistical analysis of analytical data pertaining to soil to be exported from the Site will also be conducted in accordance with receiving facility and/or Waiver conditions and may include calculations of the 80 percent (regulated receiving facilities) or 90 percent (Conditional Waiver No. 8 conditions) upper confidence levels of the mean. Laboratory analysis during in-situ sampling efforts may also be utilized during the soil profiling activities and statistical evaluations.

Segregation/interim confirmation soil samples will be obtained to assist in delineating impacted soil and also clean soil (inert waste) which will be exported throughout the course of the project. Such samples will be collected using a stainless-steel hand trowel or auger from the base and sidewalls of the excavated areas. The sample frequency of segregation/interim confirmation soil samples will be determined based in part on field conditions observed but will be no greater than 25 foot lateral distances along sidewalls and 625 square feet of excavation bottoms. If lead levels of greater than 15 mg/kg, levels of other Title 22 Metals of concern in exceedance of SD-RWQCB Tier 1 SSLs (if identified) and/or detectable levels of TPH and VOCs are found in one or more of the segregation/interim confirmation soil samples, additional excavation will occur and additional sampling will be conducted under the same protocol as described previously in this section. It should also be noted that soil that exhibits petroleum hydrocarbon staining and/or odor (even if laboratory results yield non-detectable levels of petroleum hydrocarbons or VOCs) will not be exported from the Site for reuse and will be delivered to a regulated receiving facility.

Following the mass excavation activities required for the construction of the parking structure, final confirmation/bottom soil samples will be collected from the base of the excavation footprint at a ratio of one sample for every approximately 625 square feet (one sample per 25-foot x 25-foot grid) and analyzed at a stationary analytical laboratory for total lead, TPH and VOCs. In addition, soil samples will also be collected at a minimum of 25 foot lateral and 5 foot vertical intervals from the perimeter of the excavation footprint to document levels of total lead, TPH and VOCs that will be left in place along the perimeter of the Site. As stated previously, the alpha-numeric sampling grid designation is included on Figure 3.

4.3 Analytical Laboratory Methods

A list of analytical laboratory methods to be used (as required) during the soil management activities and/or waste profiling during the course of the project is as follows:

- Single element total metal by EPA test Method 6010B or 7471A (mercury)
- Title 22 Metals by EPA test Methods 6010B and 7471A
- TPH by EPA test Method 8015B
- VOCs by EPA test Method 8260B
- Semi-volatile organic compounds by EPA test Method 8270C
- Polycyclic Aromatic Hydrocarbons by EPA test Method 8270C with Select Ion Monitoring
- Polychlorinated Biphenyls by EPA test Method 8082
- Single element soluble metal – Soluble Threshold Limit Concentration (STLC)
- Single element soluble metal – Toxicity Characteristic Leaching Procedure (TCLP)
- STLC 17 metals
- TCLP 8 metals
- Hexavalent chromium by EPA test Method 7196A
- Soil pH by EPA test Method 9045
- 96-Hour Fathead Minnow Fish Bioassay

4.4 Unexpected Discoveries During Site Mitigation

Due to the uncertainty associated with soil mitigation, especially during mass excavations completed at urban properties in the downtown San Diego area, contaminant conditions and distribution may vary from what is described in this PMP. Following discovery of an unexpected condition that requires modification to the remediation methods and protocols described in this PMP, the DEH will be informed and plan amendments will be submitted for review and approval. If any USTs are encountered during the remediation activities, the DEH Hazardous Materials Division will be notified and the UST(s) will be removed under DEH permit and in accordance with DEH guidelines.

4.5 Record Keeping

4.5.1 Chain-Of-Custody and Sample Tracking

Chain-of-custody procedures will be followed to establish a written record of sample handling and movement between the Site and the analytical laboratories. All soil samples will be delivered to the analytical laboratories on ice to maintain the samples at a target temperature of 4°C +/- 2°C. The chain-of-custodies will contain the following information:

- Project Location;
- Sample identification number;
- Date and time of collection;
- Sample collector's printed name and signature;
- Sample matrix;
- Analyses requested; and
- Signatures of individuals involved in the chain of possession.

4.5.2 Waste Manifesting

All soil that is transported to off-Site regulated landfill or treatment facilities will be done so under proper manifesting protocol to track the movement of soil from the point of generation to the final disposal point. As stated previously, soil to be removed from the Site to regulated receiving facilities is anticipated to be profiled as a non-hazardous waste. Such soil will be tracked under a non-hazardous waste manifest. In the event that hazardous waste is identified at the Site, such soil will be removed and tracked via the uniform hazardous waste manifest. The excavation contractor will maintain one copy of all waste manifests on-Site. Inert waste will be delivered to receiving sites for reuse under bills of lading or trucking logs.

4.5.3 Field Reports

In order to provide complete documentation of the fieldwork activities, detailed records will be maintained by field personnel. At a minimum, these records will include the following information:

- Site name and address;
- Date;
- Name of field log recorder;
- Team members present on-Site and associated duties;
- Other persons on-Site (i.e. subcontractors, regulatory personnel, etc.);

- A brief summary of meeting(s) held at the Site;
- Weather conditions;
- Calibration readings for field monitoring equipment (if used); and
- Any other relevant information.

4.5.4 Equipment Decontamination and Calibration

Any non-dedicated sampling equipment will be decontaminated between uses by washing with a non-phosphate detergent solution followed by successive rinses in deionized water. Disposable field equipment will not be decontaminated but will be placed in to plastic trash bags for proper disposal. An organic vapor monitor MiniRAE® 2000 PID or equivalent will be used during the fieldwork activities for health and safety monitoring (see Appendix A – Community Health and Safety Plan) and field screening of soil samples. Field instruments used during the field sampling/screening activities will be calibrated at least once per day in accordance with manufacturer's guidelines.

4.6 Reporting

The results of the soil management activities described herein will be documented in a report prepared in accordance with the most current edition of the SAM Manual. The report will be signed by a State of California licensed Professional Geologist and will describe in detail the implementation of the PMP, and will include the results of waste profiling, stockpile, segregation/interim confirmation, final confirmation/bottom and construction footprint/ perimeter soil sampling and laboratory results and documentation of the disposition of contaminated soil and inert waste that is exported from the Site. The report will also include plans that depict the locations of select soil samples in addition to cross-section diagrams that will demonstrate that contaminated soil was adequately segregated from inert waste.

Other supporting documentation to be submitted with the report include copies of analytical laboratory reports and chain-of-custody documentation, copies of weight ticket reports and manifests from the regulated facilities receiving contaminated soil that is exported from the Site, copies of bills of lading for inert waste that is exported from the Site and copies of the Notice of Intent and Inert Waste Certification documentation required under SD-RWQCB Resolution R9-2007-0104 Conditional Waiver No. 8. Please note that the required documents pertaining to the inert waste waiver will be submitted directly to the SD-RWQCB.

As stated previously, a human health risk assessment will also be completed using groundwater monitoring well sampling data to be obtained prior to the commencement of mass excavation activities. The results of the risk assessment will also be included in the Closure Report, as well as a discussion of the more recent groundwater sampling data and the extent of contamination at the Site remaining in place. The Closure Report will seek closure of both LOP Case #H23307-002 and the VAP case for the project. Uploading of all documents required to be posted to the California State Water Resources Control Board Geotracker database (including the Closure Report) will also be completed.

5.0 REFERENCES

California State Water Resources Control Board, Water Quality Control Plan for the San Diego Basin (9), San Diego, California, Published 2002;

California State Water Resources Control Board, Water Quality Control Plan for the San Diego Basin (9), San Diego, California, Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate the Revised Conditional Waiver of Waste Discharge Requirements for Specific Types of Discharge Within the San Diego Region, Appendix D, Section 8.II.D, dated October 10, 2007;

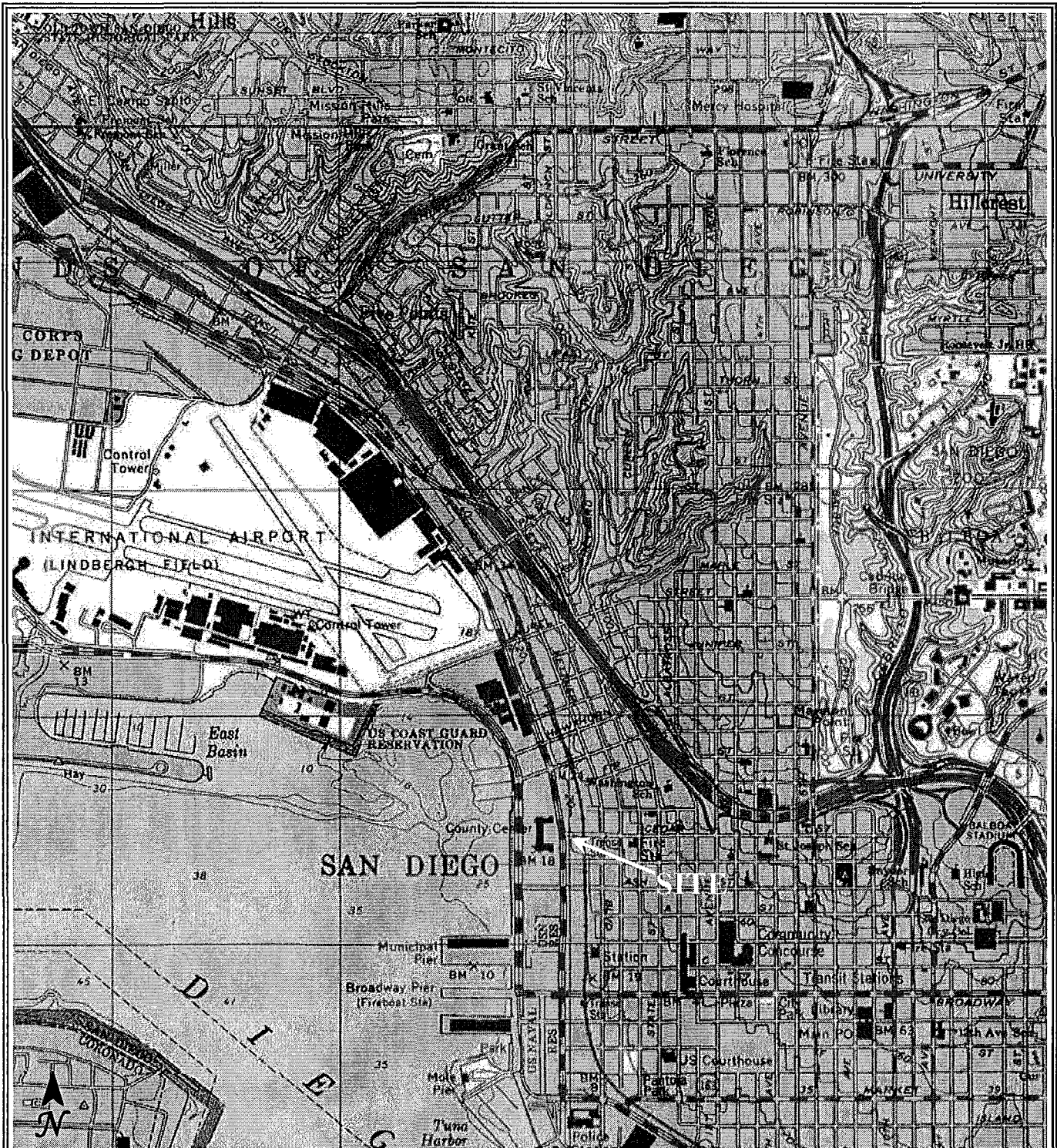
County of San Diego Department of Environmental Health, Site Assessment and Mitigation Manual (2004);

Kennedy, M.P., 1975, Geology of the San Diego Metropolitan Area, California, California Department of Conservation, Division of Mines and Geology, Bulletin 200.

Kennedy, M.P. and Tan, S.S., 2008, Geologic Map of the San Diego 30' x 60' Quadrangle, California, scale 1:100,000, California Department of Conservation, California Geological Survey.

USGS topographic map, Point Loma, California 7.5-Minute Quadrangle (1996).

FIGURES



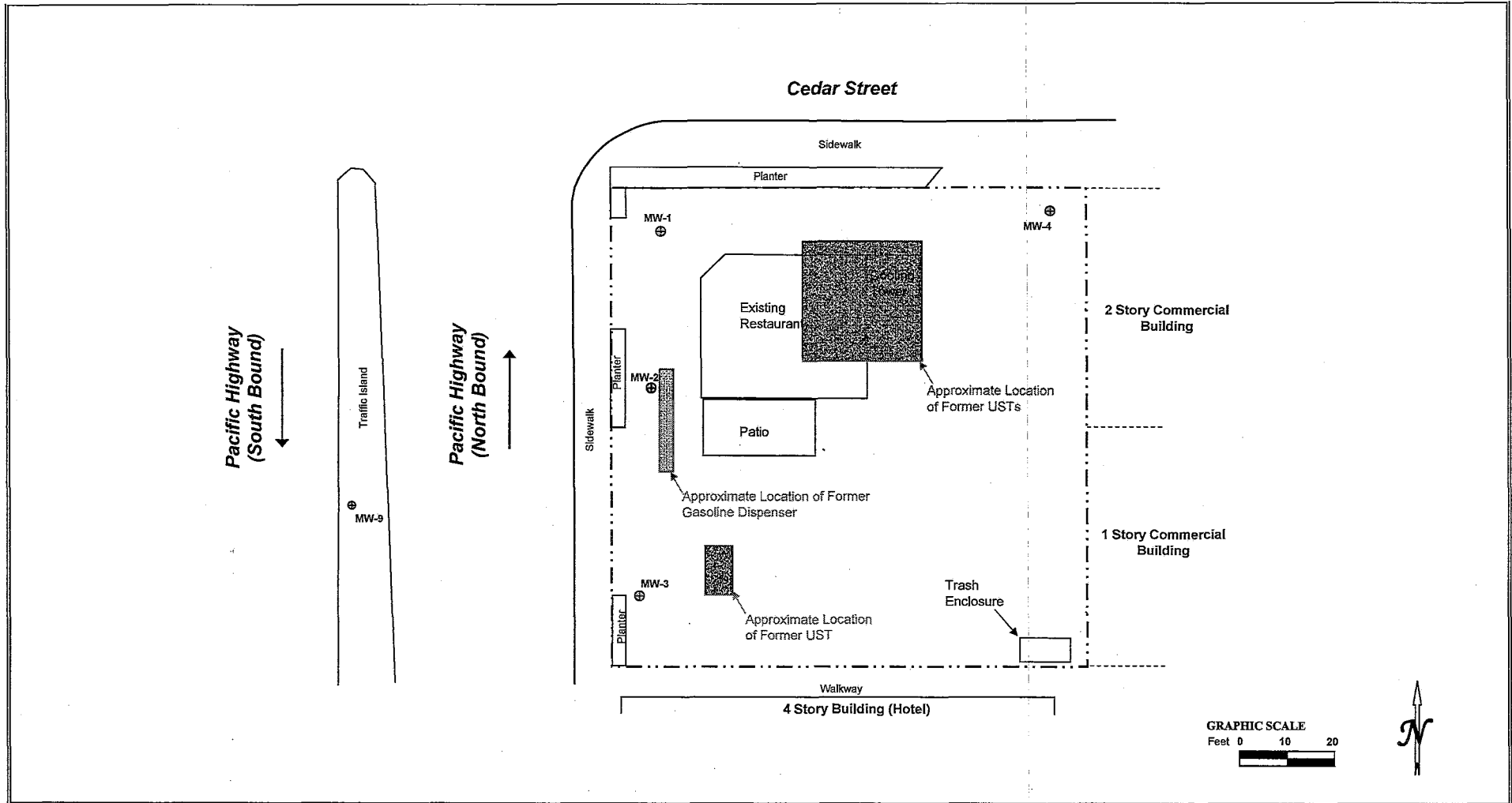
*from Point Loma, CA 7.5' Topographic Quadrangle 2000, Approximate Scale 1"=2,000'

ADVANTAGE ENVIRONMENTAL CONSULTANTS, LLC.

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 Phone: 760-744-3363 Fax 760-744-3383

FIGURE 1
 Vicinity Map
 Fire Station No. 2 - Bayside
 1595 Pacific Highway
 San Diego, California 92101

Work Order No.:	Report Date:	Drawn By:
10-069SD	July 2011	MJF



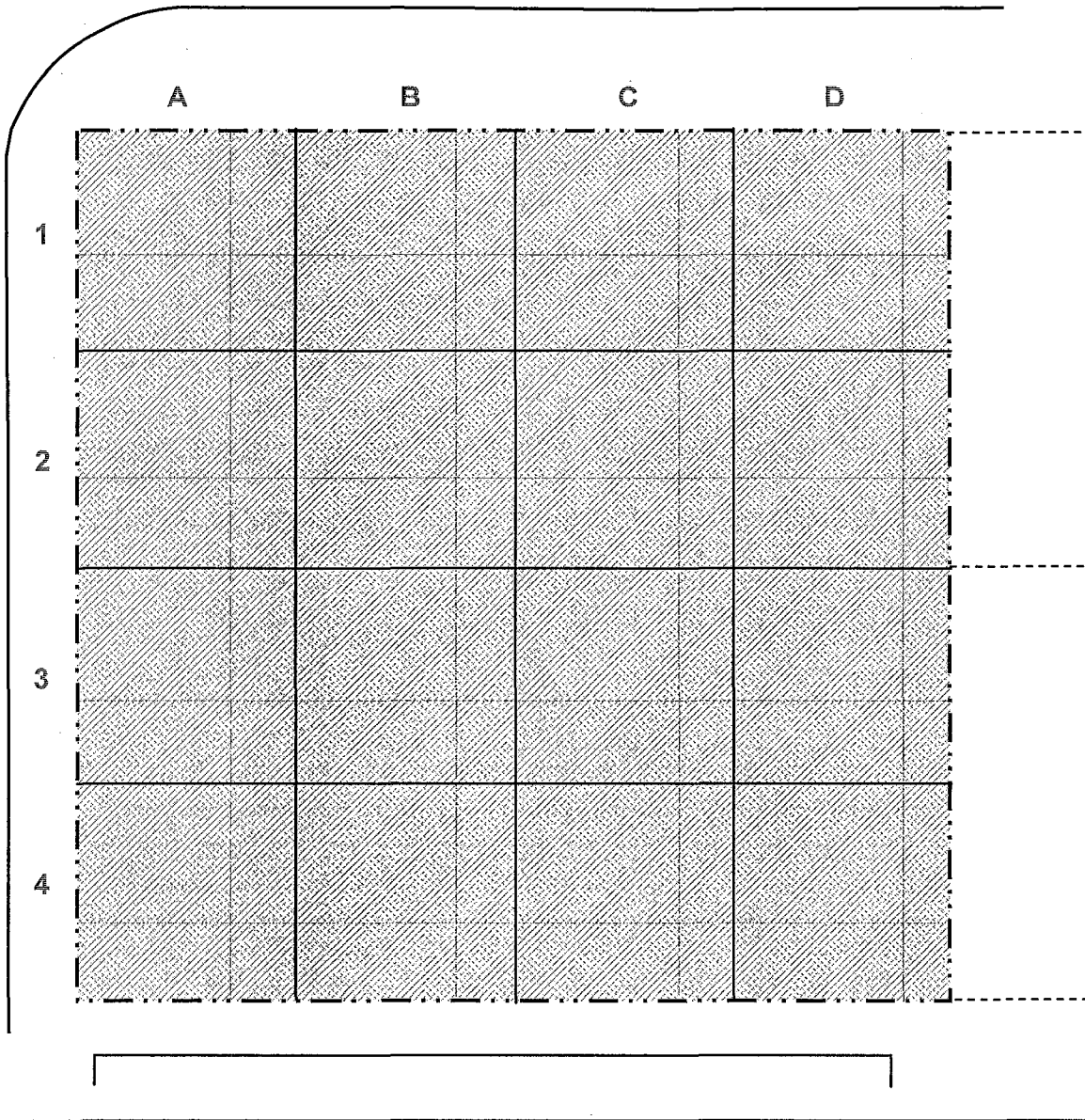
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LEGEND	
--- · · · ---	Property Line (Approximate)
MW-9 ⊕	Approximate location of existing groundwater monitoring well installed by LeRoy Crandall and Associates (1990)



FIGURE 2 Site Plan Fire Station No. 2 - Bayside 1595 Pacific Highway San Diego, California		
AEC Project No.: 10-069-SD	Figure Date: July 2011	Drawn By: MJF

Cedar Street

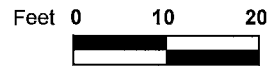
Pacific Highway



LEGEND

-  Property Line (Approximate)
-  Planned area for grading and excavation

GRAPHIC SCALE



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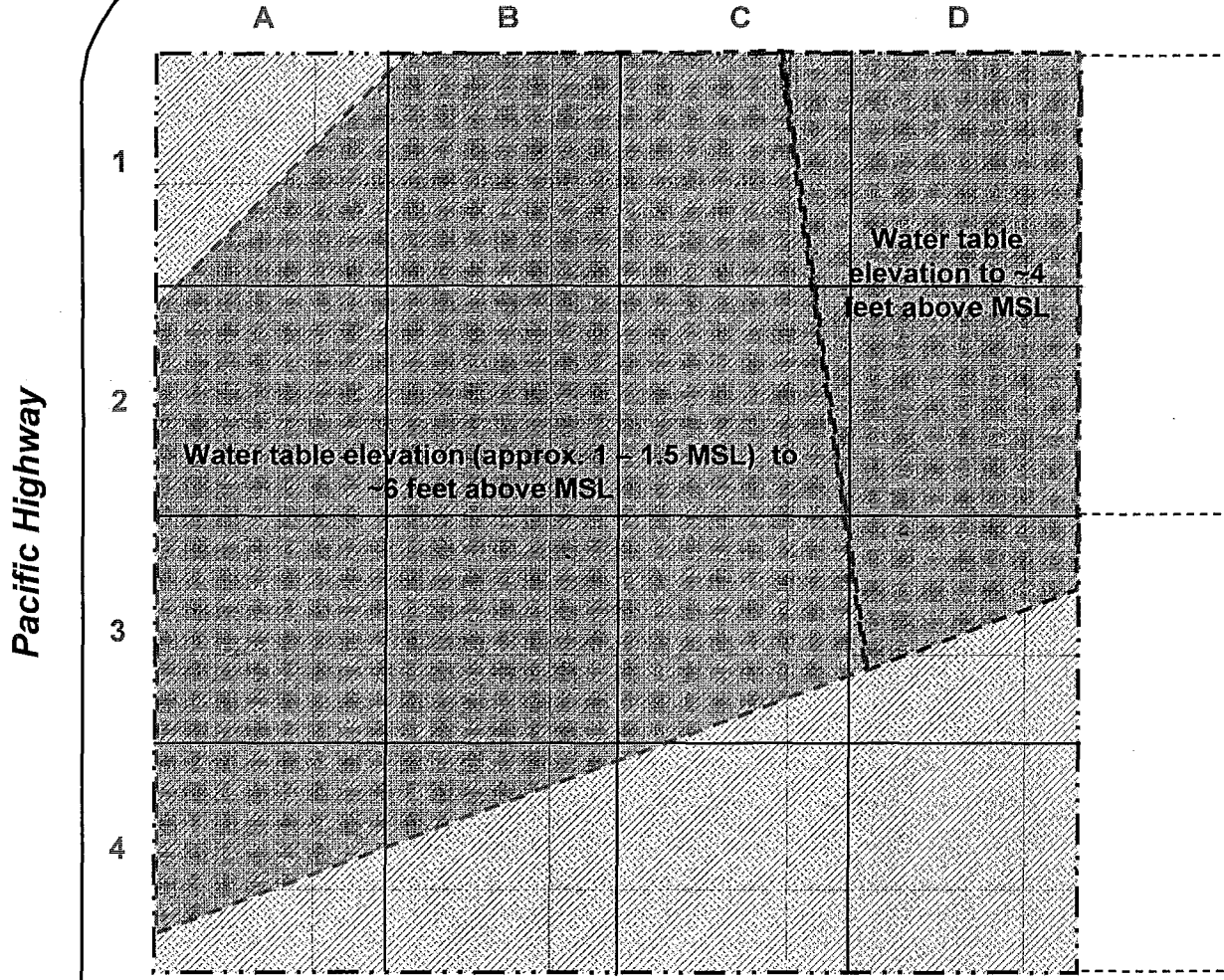
FIGURE 3
Site Plan With Grid Designation
 Fire Station No. 2 – Bayside
 1595 Pacific Highway, San Diego, California

Work Order No.:
 10-069-SD

Report Date:
 July 2011

Drawn By:
 MJF

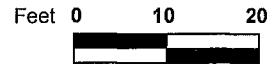
Cedar Street



LEGEND

- Property Line (Approximate)
- Planned area for grading and excavation
- Estimated area of Petroleum Impacted Soil

GRAPHIC SCALE



ADVANTAGE ENVIRONMENTAL CONSULTANTS, LLC.

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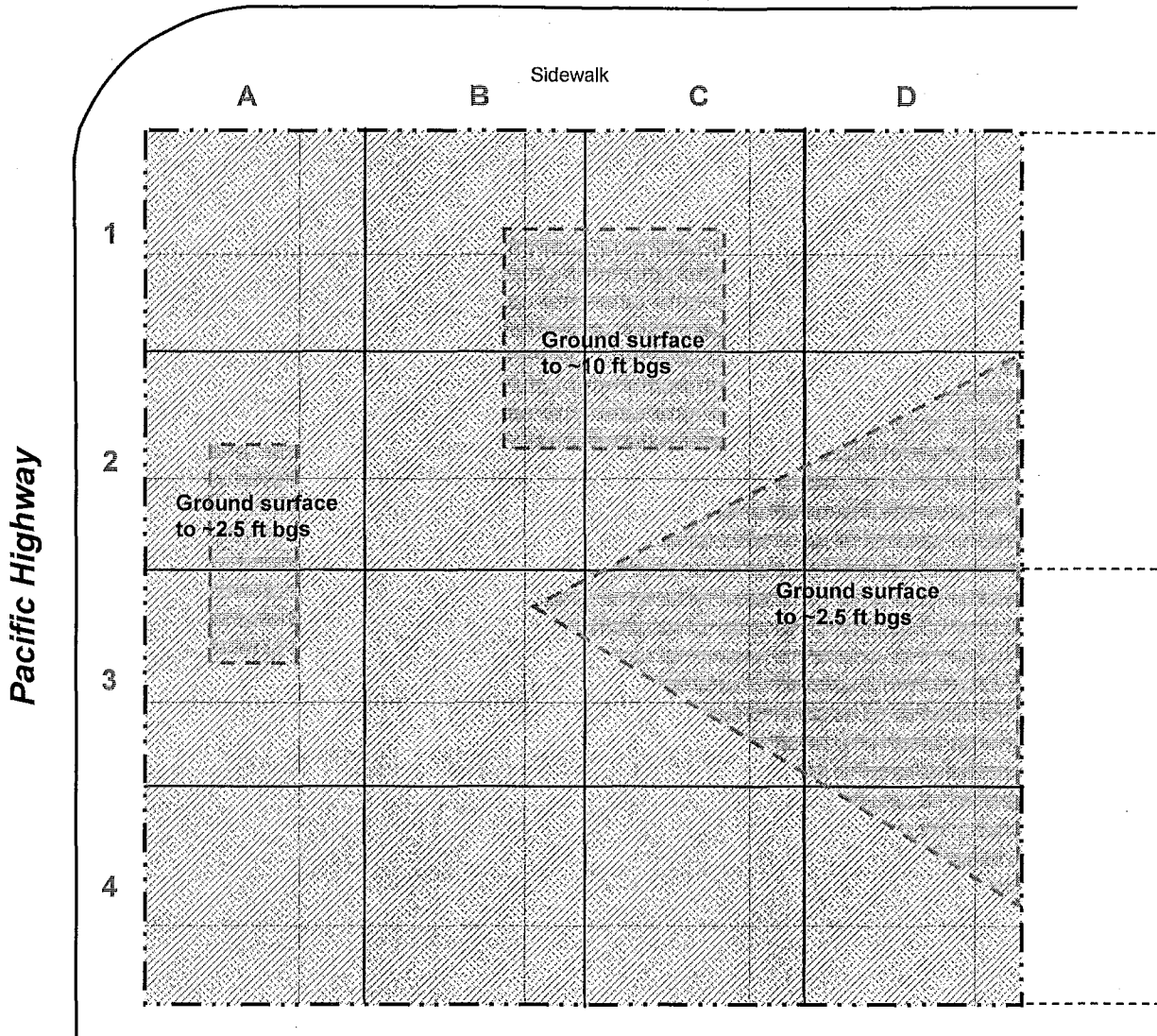
FIGURE 4
Site Plan With Proposed Petroleum Removal Areas
 Fire Station No. 2 – Bayside
 1595 Pacific Highway, San Diego, California

Work Order No.:
10-069-SD



Report Date:
July 2011

Drawn By:
MJF

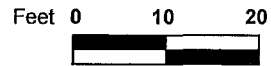
Cedar Street



LEGEND

- Property Line (Approximate)
-  Planned area for grading and excavation
-  Estimated area of lead-impacted soil (Pb > 15 mg/kg)

GRAPHIC SCALE



ADVANTAGE ENVIRONMENTAL CONSULTANTS, LLC.

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FIGURE 5

Site Plan With Proposed Lead Removal Areas

Fire Station No. 2 - Bayside
 1595 Pacific Highway, San Diego, California

Work Order No.:
 10-069-SD

Report Date:
 July 2011

Drawn By:
 MJF

APPENDIX A – COMMUNITY HEALTH AND SAFETY PLAN

COMMUNITY HEALTH AND SAFETY PLAN

Fire Station No. 2 (Bayside) 1595 Pacific Highway San Diego, California 92101

Project Description

On behalf of Centre City Development Corporation (CCDC), Advantage Environmental Consultants, LLC (AEC) has prepared this Community Health and Safety Plan (CHSP) for the proposed Fire Station No. 2 (Bayside) property identified by the legal address of 1595 Pacific Highway, San Diego, California (i.e. the "Site"). The Site is further identified by County of San Diego Assessor's Parcel Numbers (APN) 533-321-01-00 and 533-321-02-00, and as Lots 1 and 2 in Block 288 of Middletown, in the City of San Diego, County of San Diego, State of California.

The City of San Diego is the owner of the subject Site. It is the intention of CCDC, on behalf of the City and its Redevelopment Agency, to retain contractors to demolish existing improvements at the Site and construct a new fire station to be identified as Fire Station No. 2 (Bayside). Planned redevelopment of the Site includes construction of a three-story structure with a one level subterranean parking garage and basement. Construction activities will include the excavation, removal, and export of approximately 4,000 cubic yards (c.y.) of soil from the Site with excavation depths ranging from approximately 10 to 15 feet below existing grades. Shoring systems will be utilized for the purposes of stabilizing vertical sidewalls. Based on the proposed subterranean component for the redevelopment project and historical groundwater elevations recorded in groundwater monitoring wells located at the Site, groundwater dewatering will be required during grading operations.

Of the approximately 4,000 c.y. of soil to be displaced during construction of the basement for the proposed Site building, it is currently estimated that approximately 1,500 c.y. of such soil is impacted with lead and/or petroleum hydrocarbons and will require segregation, special handling and off-site disposal or treatment at regulated receiving facilities. More specifically, of the 1,500 c.y. of contaminated soils, lead-impacted soils are estimated at approximately 425 c.y. and hydrocarbon-impacted soils are estimated at approximately 1,075 c.y. Remaining clean soil (i.e. inert waste) will be removed from the Site under Tier 1 or Tier 2 designations as described and in accordance with San Diego Regional Water Quality Control Board (SD-RWQCB) Resolution R9-2007-0104 Conditional Waiver No. 8 requirements, which apply to the temporary stockpiling and subsequent use of soil categorized as inert waste containing metals from known contaminated properties.

Prior environmental assessments were conducted at the Site between 1990 and 1993, and in 2005. Based on AEC's interpretation of such data, total petroleum hydrocarbons (TPH) in the gasoline and diesel ranges and volatile organic compounds (VOCs) are considered to be the contaminants of concern (COCs) at the Site. Total lead was detected at a maximum concentration of 48.6 milligrams per kilogram (mg/kg) in artificial fill material at the Site during the 2005 subsurface assessment. This concentration does not exceed human health risk based thresholds for total lead in residential and commercial/industrial soils or waste profiling related thresholds regarding solubility of this metal as it pertains to waste profiling. As such, lead is not considered to be a COC at the Site. However, some of the lead concentrations do exceed local screening levels pertaining to off-Site reuse of soil at unregulated receiving

facilities. Soil with lead concentrations exceeding reuse related screening levels, in addition to soil that is contaminated with TPH and VOCs, will require special handling and disposal during future excavation activities. Other heavy metals and organic compounds are also not considered to be COCs for the Site at this time, but may require further evaluation as part of inert waste tracking and documentation if other metals or organic compounds of concern at the Site are revealed during the course of the project.

The estimated volume of lead-impacted soil previously discussed is anticipated to be located at three localized locations, two of the locations within the upper 0.5 foot to 2.5 feet of soil at the Site, and one of the locations in a former underground storage tank (UST) cavity from approximately 0.5 foot to 10 feet below the surface. The TPH and VOC impacted soils are interpreted to underlie approximately three-quarters of the Site, and at a minimum from groundwater elevation to generally no shallower than five feet from existing grades. Petroleum impacts to soil are also present within the former UST cavity area referenced above. TPH and VOC impacted soils beneath the Site are the result of gasoline and diesel releases likely associated with the UST system for the former gasoline service station that operated at the Site between 1940 and 1971. Up to six underground storage tanks were documented to have been previously used at the Site. Petroleum impacts are expected to reach the bottom of the proposed depths of excavation at the impacted areas at the Site based on a review of available data.

This CHSP is included as an appendix to the Remedial Action and Property Mitigation Plan (PMP) for the project. The primary objective of the PMP is to affirm the protection of human health during the proposed excavation activities, to complete petroleum hydrocarbon source removal activities within the excavation footprint, to affirm the long term health and safety of users of the Site and to affirm that there is no on-going threat to natural resources. Management of soil contaminated with hazardous substances and petroleum products during the proposed excavation activities at the Site will be conducted under the oversight of the County of San Diego Department of Environmental Health (DEH) via the Voluntary Assistance Program. At the completion of the work proposed in the PMP, a Closure Report will be submitted to the DEH.

The objective of this CHSP is to assist in providing adequate protection of human and public health during the planned remediation activities at the Site and implementation of the PMP. This plan is not a worker health and safety plan and it should not be used for such a purpose. A worker health and safety plan will be drafted at a later date prior to the commencement of mitigation activities.

Evaluation of Potential Public Exposure to Hazards

Potential public health hazards and exposure pathways resulting from Site activities may result from exposure to vapors, dust, noise, and physical hazards. Exposure to lead dust and petroleum hydrocarbon vapors, particularly as gasoline and diesel in soil, are the hazardous constituents of primary concern. Inhalation of vapors or ambient dust is the exposure route of primary concern. These substances may also enter the unprotected body by skin absorption, eye contact, and/or inadvertent ingestion. Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from an acute exposure usually occur during or shortly after exposure to a sufficiently high concentration. Symptoms resulting from a chronic exposure generally occur following prolonged or repeated exposures to lower concentrations. The concentrations required to produce symptoms of exposure depend upon the medium in which the compounds occur, the duration of exposure, and the number of exposures. Generally, symptoms resulting from an exposure to petroleum

hydrocarbon vapors and petroleum hydrocarbon and lead dusts include, but are not limited to, irritation of mucous membranes and pharynx, nasal perforation, irritation of the eyes and/or skin. During the remedial work to be conducted at the Site, potential nuisance odors will be considered a condition that requires attention and control methods as required. However it should be noted that nuisance odors are not considered to be a potential public health hazard.

Potential physical hazards to the public associated with soil excavation include explosion, fire, electrical shock, and noise exposure.

- **Explosions and fires** often arise spontaneously. However, they more commonly result from activities where an ignition source (such as a spark from equipment) is introduced to an explosive or flammable environment. Workers will use spark resistant equipment and tools (when feasible), and fire extinguishers will be made available during the Site activities to assist in preventing such a situation.
- **Electrical hazards** include buried cables which pose a danger of shock or electrocution if workers or equipment contact or sever them during Site operations. In accordance with State law, Underground Service Alert (USA) will be notified at least 48 hours prior to any excavation activities. A private utility locating company will also likely be retained by the contractor or Site owner as part of the redevelopment activities.
- **Noise hazards** can be created by equipment that generates noise in excess of auditory capacity thresholds. Noise in excess human auditory thresholds can result in physical damage to the ear.

Control Methods

- **Site Security.** To assist in excluding the public from the Site, a pedestrian barricade (typically eight feet high) will be constructed around the perimeter of the Site. Access gates (locations yet to be determined) will be installed along the barriers. Gates will be locked after hours, closed during construction activities, and opened when construction or employee vehicles or equipment enter or exit the project area.
- **Open Excavations.** Open excavations will be secured from public access by placing barricades or pylons at the perimeter of the excavations and locking access gates to the Site at the conclusion of each day's field activities. In accordance with 29 CFR 1926.652, the walls and faces of excavations and trenches over 4-feet deep will be guarded by a shoring system, sloping of the ground, or some other equivalent means, such as trench boxes, shields, or other approved movable shoring systems. Trenches less than four feet deep where hazardous ground movement is likely will also require protection. Any area to be subjected to excavation will be secured with fencing. The fence will be placed at such a distance from the excavation so as to inhibit viewing in the excavation, and thus reduce the potential for public and transient curiosity. A competent person will make daily inspections of trenches and excavations to assure adequate slopes, shoring, and bracing, and to check for evidence of potential slides or cave-ins. More frequent inspections may be necessary after a rain event.

- **Stockpiled Soil.** Excavated soil will be temporarily stockpiled and covered with plastic sheeting to reduce the potential for runoff. Disposal of the soil at an off-Site recycling facility will occur once the laboratory analytical results are known and waste profiling and characterization are completed.
- **BMPs.** Stockpiles will be protected from storm water run-on by fiber rolls, gravel bags, or other appropriate methods. Soil stockpiles will be protected from wind erosion by application of water and by placing on and covering with plastic sheeting.
- **Noise.** Noise levels are not expected to exceed the maximum allowable levels for the area. Work hours will be limited to between 7 a.m. and 5 p.m., Monday through Saturday.

Potential exposure hazards to the public associated with soil excavation include vapors and dust.

Control Methods

- **Vapors.** Engineering and construction practices will be used to reduce vapor emissions including covering off-gassing excavations or stockpiles, misting excavations or stockpiles with water or other vapor suppressing agents, locating stockpiles away from and/or downwind of public receptors, and stopping work until mitigation measures are in place. As stated previously, while potential nuisance odors are not considered to be a potential public health hazard, they will be considered a condition that requires attention and control methods as required. Efforts to minimize nuisance odors (if required) will be conducted in a similar manner to those to be implemented for vapor suppression purposes.
- **Dust Control.** Dust control methods will be taken to minimize potential public exposure to dust generated as a result of the planned excavation activities. Dust suppression measures to be employed include, covering stockpiled soil with plastic sheeting, reducing the pace of the excavation as required until effective mitigation measures are in place, and/or maintaining levels of soil moisture by means of continuous moistening.

Air Monitoring

During the excavation activities, air monitoring will be performed utilizing a hand-held photoionization detector (PID) to assess potential levels of organic vapors possibly resulting from diesel/gasoline vapors releasing from excavated soil. Fugitive organic chemical vapors will be monitored along in the vicinity of the excavation perimeter at 15-minute intervals throughout each work day in which excavation activities occur. A reading of 10 parts per million or greater on a PID at the down-wind perimeter shall initiate taking corrective measures. The PID will be calibrated in accordance with manufacturer specifications and monitoring records will be maintained and made available for review upon request.

Site Safety Manager

The designated Site Safety Manager for the contractor will be determined at a later date. The Site Safety Manager will have the knowledge and authority necessary to cease any and all construction activities at the Site in the event of an emergency. The Site Safety Manager will work in conjunction with CCDC's environmental consultant regarding soil contamination hazards. In the event of a sudden release of a substance

that represents an imminent threat to public health, the Site safety manager will initiate the cessation of activity contributing to such a release and notify the DEH. Key project representatives for CCDC's environmental consultant will also be determined at a later date and contact information for such representatives will be provided to the DEH prior to the commencement of work.

Emergency Planning

If a community emergency situation arises, project managers of CCDC's environmental consultant will immediately coordinate the appropriate emergency response with other on-Site personnel and CCDC, as well as the County of San Diego DEH.

Public Notification

The attached public notification form (to be modified and finalized closer to the commencement of redevelopment activities and upon contractor selection) will be posted in numerous conspicuous locations including, but not limited to the perimeter fencing at the project Site (four corners and entrance gates). The notification may also be personally delivered to adjacent property owners and occupants.

Worker Health and Safety

As stated previously, the designated Site safety manager for the contractor will be determined at a later date. The Site safety manager will coordinate with project representatives to ensure that their workers involved with the displacement and/or handling of contaminated soil are properly trained to conduct such activities. Worker health and safety guidelines or procedures specified by CCDC and/or contractors will be monitored by the Site safety manager and contractor foreman and include, but are not limited to:

- Establishment of appropriate work zones
- Conducting health and safety meetings
- Use of proper personal protective equipment
- Personal hygiene requirements
- Equipment decontamination procedures
- Medical surveillance as needed
- Emergency response protocols

Site Traffic Control

Ingress and egress points for trucks that will transport contaminated or non-contaminated soil will be determined at a later date. The excavation contractor will be required to provide adequate traffic control (including flag persons) throughout the excavation activities. Prior to the off-Site transport of soil, the excavation contractor will be responsible for the inspection of each truckload to ensure that they are adequately covered and properly manifested. The contractor will also be responsible for ensuring that trucks are cleaned of overburden soil that may be present on the vehicles. As trucks leave the Site, they will be assisted by the flag persons to ensure safe merging in to oncoming traffic.

Stormwater Management

A stormwater pollution prevention plan or other related document pertaining to the Site has not been completed at this time but will be prepared per requirements of the City of San Diego and permit processing for the project.

PUBLIC NOTICE

**Fire Station No. 2 (Bayside)
1595 Pacific Highway
San Diego, California 92101**

ENVIRONMENTAL CONSULTANT and CONTRACTOR will be conducting remediation activities at this property, including the excavation of lead, petroleum hydrocarbon and volatile organic compound contaminated soil under supervision from the County of San Diego Department of Environmental Health (DEH). Some soil to be removed from the Site contains one or more chemicals known to the State of California to cause cancer, birth defects or reproductive harm.

Construction activities are scheduled for INSERT DATE to INSERT DATE, between the hours of 7 a.m. and 5 p.m., Monday through Saturday. Efforts will be made to keep dust, noise and odor to a minimum.

If there are any public concerns related to these activities please call:

Environmental Consultant: CONSULTANT NAME

CONSULTANT CONTACT ###-###-#### (office) or ###-###-#### (24-Hour Contact)

Contractor: CONTRACTOR NAME

CONTRACTOR CONTACT ###-###-#### (office) or ###-###-#### (24-Hour Contact)

County of San Diego Department of Environmental Health – Site Assessment and Mitigation Division

Teresa Sherman (858) 505-6797

In the event of an emergency, please call: 911

CALIFORNIA HEALTH AND SAFETY CODE SEC. 25249.6

APPENDIX B
FIRE HYDRANT METER PROGRAM

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 1 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

1. **PURPOSE**

- 1.1 To establish a Departmental policy and procedure for issuance, proper usage and charges for fire hydrant meters.

2. **AUTHORITY**

- 2.1 All authorities and references shall be current versions and revisions.
- 2.2 San Diego Municipal Code (NC) Chapter VI, Article 7, Sections 67.14 and 67.15
- 2.3 Code of Federal Regulations, Safe Drinking Water Act of 1986
- 2.4 California Code of Regulations, Titles 17 and 22
- 2.5 California State Penal Code, Section 498B.0
- 2.6 State of California Water Code, Section 110, 500-6, and 520-23
- 2.7 Water Department Director

Reference

- 2.8 State of California Guidance Manual for Cross Connection Programs
- 2.9 American Water Works Association Manual M-14, Recommended Practice for Backflow Prevention
- 2.10 American Water Works Association Standards for Water Meters
- 2.11 U.S.C. Foundation for Cross Connection Control and Hydraulic Research Manual

3. **DEFINITIONS**

- 3.1 **Fire Hydrant Meter:** A portable water meter which is connected to a fire hydrant for the purpose of temporary use. (These meters are sometimes referred to as Construction Meters.)

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 2 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

- 3.2 **Temporary Water Use:** Water provided to the customer for no longer than twelve (12) months.
- 3.3 **Backflow Preventor:** A Reduced Pressure Principal Assembly connected to the outlet side of a Fire Hydrant Meter.

4. **POLICY**

- 4.1 The Water Department shall collect a deposit from every customer requiring a fire hydrant meter and appurtenances prior to providing the meter and appurtenances (see Section 7.1 regarding the Fees and Deposit Schedule). The deposit is refundable upon the termination of use and return of equipment and appurtenances in good working condition.
- 4.2 Fire hydrant meters will have a 2 ½" swivel connection between the meter and fire hydrant. The meter shall not be connected to the 4" port on the hydrant. All Fire Hydrant Meters issued shall have a Reduced Pressure Principle Assembly (RP) as part of the installation. Spanner wrenches are the only tool allowed to turn on water at the fire hydrant.
- 4.3 The use of private hydrant meters on City hydrants is prohibited, with exceptions as noted below. All private fire hydrant meters are to be phased out of the City of San Diego. All customers who wish to continue to use their own fire hydrant meters must adhere to the following conditions:
- a. Meters shall meet all City specifications and American Water Works Association (AWWA) standards.
 - b. Customers currently using private fire hydrant meters in the City of San Diego water system will be allowed to continue using the meter under the following conditions:
 1. The customer must submit a current certificate of accuracy and calibration results for private meters and private backflows annually to the City of San Diego, Water Department, Meter Shop.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 3 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

2. The meter must be properly identifiable with a clearly labeled serial number on the body of the fire hydrant meter. The serial number shall be plainly stamped on the register lid and the main casing. Serial numbers shall be visible from the top of the meter casing and the numbers shall be stamped on the top of the inlet casing flange.
3. All meters shall be locked to the fire hydrant by the Water Department, Meter Section (see Section 4.7).
4. All meters shall be read by the Water Department, Meter Section (see Section 4.7).
5. All meters shall be relocated by the Water Department, Meter Section (see Section 4.7).
6. These meters shall be tested on the anniversary of the original test date and proof of testing will be submitted to the Water Department, Meter Shop, on a yearly basis. If not tested, the meter will not be allowed for use in the City of San Diego.
7. All private fire hydrant meters shall have backflow devices attached when installed.
8. The customer must maintain and repair their own private meters and private backflows.
9. The customer must provide current test and calibration results to the Water Department, Meter Shop after any repairs.
10. When private meters are damaged beyond repair, these private meters will be replaced by City owned fire hydrant meters.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 4 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

11. When a private meter malfunctions, the customer will be notified and the meter will be removed by the City and returned to the customer for repairs. Testing and calibration results shall be given to the City prior to any re-installation.
 12. The register shall be hermetically sealed straight reading and shall be readable from the inlet side. Registration shall be in hundred cubic feet.
 13. The outlet shall have a 2 ½ "National Standards Tested (NST) fire hydrant male coupling.
 14. Private fire hydrant meters shall not be transferable from one contracting company to another (i.e. if a company goes out of business or is bought out by another company).
- 4.4 All fire hydrant meters and appurtenances shall be installed, relocated and removed by the City of San Diego, Water Department. All City owned fire hydrant meters and appurtenances shall be maintained by the City of San Diego, Water Department, Meter Services.
- 4.5 If any fire hydrant meter is used in violation of this Department Instruction, the violation will be reported to the Code Compliance Section for investigation and appropriate action. Any customer using a fire hydrant meter in violation of the requirements set forth above is subject to fines or penalties pursuant to the Municipal Code, Section 67.15 and Section 67.37.
- 4.6 **Conditions and Processes for Issuance of a Fire Hydrant Meter**
- Process for Issuance
- a. Fire hydrant meters shall only be used for the following purposes:
 1. Temporary irrigation purposes not to exceed one year.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 5 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

2. Construction and maintenance related activities (see Tab 2).
 - b. No customer inside or outside the boundaries of the City of San Diego Water Department shall resell any portion of the water delivered through a fire hydrant by the City of San Diego Water Department.
 - c. The City of San Diego allows for the issuance of a temporary fire hydrant meter for a period not to exceed 12 months (365 days). An extension can only be granted in writing from the Water Department Director for up to 90 additional days. A written request for an extension by the consumer must be submitted at least 30 days prior to the 12 month period ending. No extension shall be granted to any customer with a delinquent account with the Water Department. No further extensions shall be granted.
 - d. Any customer requesting the issuance of a fire hydrant meter shall file an application with the Meter Section. The customer must complete a "Fire Hydrant Meter Application" (Tab 1) which includes the name of the company, the party responsible for payment, Social Security number and/or California ID, requested location of the meter (a detailed map signifying an exact location), local contact person, local phone number, a contractor's license (or a business license), description of specific water use, duration of use at the site and full name and address of the person responsible for payment.
 - e. At the time of the application the customer will pay their fees according to the schedule set forth in the Rate Book of Fees and Charges, located in the City Clerk's Office. All fees must be paid by check, money order or cashiers check, made payable to the City Treasurer. Cash will not be accepted.
 - f. No fire hydrant meters shall be furnished or relocated for any customer with a delinquent account with the Water Department.
 - g. After the fees have been paid and an account has been created, the

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 6 OF 10	EFFECTIVE DATE October 15, 2002
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meter shall be installed within 48 hours (by the second business day). For an additional fee, at overtime rates, meters can be installed within 24 hours (within one business day).

4.7 Relocation of Existing Fire Hydrant Meters

- a. The customer shall call the Fire Hydrant Meter Hotline (herein referred to as "Hotline"), a minimum of 24 hours in advance, to request the relocation of a meter. A fee will be charged to the existing account, which must be current before a work order is generated for the meter's relocation.
- b. The customer will supply in writing the address where the meter is to be relocated (map page, cross street, etc). The customer must update the original Fire Hydrant Meter Application with any changes as it applies to the new location.
- c. Fire hydrant meters shall be read on a monthly basis. While fire hydrant meters and backflow devices are in service, commodity, base fee and damage charges, if applicable, will be billed to the customer on a monthly basis. If the account becomes delinquent, the meter will be removed.

4.8 Disconnection of Fire Hydrant Meter

- a. After ten (10) months a "Notice of Discontinuation of Service" (Tab 3) will be issued to the site and the address of record to notify the customer of the date of discontinuance of service. An extension can only be granted in writing from the Water Department Director for up to 90 additional days (as stated in Section 4.6C) and a copy of the extension shall be forwarded to the Meter Shop Supervisor. If an extension has not been approved, the meter will be removed after twelve (12) months of use.
- b. Upon completion of the project the customer will notify the Meter Services office via the Hotline to request the removal of the fire hydrant meter and appurtenances. A work order will be generated

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for removal of the meter.

- c. Meter Section staff will remove the meter and backflow prevention assembly and return it to the Meter Shop. Once returned to the Meter Shop the meter and backflow will be tested for accuracy and functionality.
- d. Meter Section Staff will contact and notify Customer Services of the final read and any charges resulting from damages to the meter and backflow or its appurtenance. These charges will be added on the customer's final bill and will be sent to the address of record. Any customer who has an outstanding balance will not receive additional meters.
- e. Outstanding balances due may be deducted from deposits and any balances refunded to the customer. Any outstanding balances will be turned over to the City Treasurer for collection. Outstanding balances may also be transferred to any other existing accounts.

5. **EXCEPTIONS**

- 5.1 Any request for exceptions to this policy shall be presented, in writing, to the Customer Support Deputy Director, or his/her designee for consideration.

6. **MOBILE METER**

- 6.1 Mobile meters will be allowed on a case by case basis. All mobile meters will be protected by an approved backflow assembly and the minimum requirement will be a Reduced Pressure Principal Assembly. The two types of Mobile Meters are vehicle mounted and floating meters. Each style of meters has separate guidelines that shall be followed for the customer to retain service and are described below:

- a) **Vehicle Mounted Meters:** Customer applies for and receives a City owned Fire Hydrant Meter from the Meter Shop. The customer mounts the meter on the vehicle and brings it to the Meter Shop for

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
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inspection. After installation is approved by the Meter Shop the vehicle and meter shall be brought to the Meter Shop on a monthly basis for meter reading and on a quarterly basis for testing of the backflow assembly. Meters mounted at the owner's expense shall have the one year contract expiration waived and shall have meter or backflow changed if either fails.

- b) **Floating Meters:** Floating Meters are meters that are not mounted to a vehicle. **(Note: All floating meters shall have an approved backflow assembly attached.)** The customer shall submit an application and a letter explaining the need for a floating meter to the Meter Shop. The Fire Hydrant Meter Administrator, after a thorough review of the needs of the customer, (i.e. number of jobsites per day, City contract work, lack of mounting area on work vehicle, etc.), may issue a floating meter. At the time of issue, it will be necessary for the customer to complete and sign the "Floating Fire Hydrant Meter Agreement" which states the following:

- 1) The meter will be brought to the Meter Shop at 2797 Caminito Chollas, San Diego on the third week of each month for the monthly read by Meter Shop personnel.
- 2) Every other month the meter will be read and the backflow will be tested. This date will be determined by the start date of the agreement.

If any of the conditions stated above are not met the Meter Shop has the right to cancel the contract for floating meter use and close the account associated with the meter. The Meter Shop will also exercise the right to refuse the issuance of another floating meter to the company in question.

Any Fire Hydrant Meter using reclaimed water shall not be allowed use again with any potable water supply. The customer shall incur the cost of replacing the meter and backflow device in this instance.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
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7. FEE AND DEPOSIT SCHEDULES

7.1 **Fees and Deposit Schedules:** The fees and deposits, as listed in the Rate Book of Fees and Charges, on file with the Office of the City Clerk, are based on actual reimbursement of costs of services performed, equipment and materials. These deposits and fees will be amended, as needed, based on actual costs. Deposits, will be refunded at the end of the use of the fire hydrant meter, upon return of equipment in good working condition and all outstanding balances on account are paid. Deposits can also be used to cover outstanding balances.

All fees for equipment, installation, testing, relocation and other costs related to this program are subject to change without prior notification. The Mayor and Council will be notified of any future changes.

8. UNAUTHORIZED USE OF WATER FROM A HYDRANT

8.1 Use of water from any fire hydrant without a properly issued and installed fire hydrant meter is theft of City property. Customers who use water for unauthorized purposes or without a City of San Diego issued meter will be prosecuted.

8.2 If any unauthorized connection, disconnection or relocation of a fire hydrant meter, or other connection device is made by anyone other than authorized Water Department personnel, the person making the connection will be prosecuted for a violation of San Diego Municipal Code, Section 67.15. In the case of a second offense, the customer's fire hydrant meter shall be confiscated and/or the deposit will be forfeited.

8.3 Unauthorized water use shall be billed to the responsible party. Water use charges shall be based on meter readings, or estimates when meter readings are not available.

8.4 In case of unauthorized water use, the customer shall be billed for all applicable charges as if proper authorization for the water use had been obtained, including but not limited to bi-monthly service charges, installation charges and removal charges.

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 10 OF 10	EFFECTIVE DATE October 15, 2002
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8.5 If damage occurs to Water Department property (i.e. fire hydrant meter, backflow, various appurtenances), the cost of repairs or replacements will be charged to the customer of record (applicant).

**Larry Gardner
Water Department Director**

- Tabs: 1. Fire Hydrant Meter Application
2. Construction & Maintenance Related Activities With No Return To Sewer
3. Notice of Discontinuation of Service

APPENDIX

Administering Division: Customer Support Division

Subject Index: Construction Meters
Fire Hydrant
Fire Hydrant Meter Program
Meters, Floating or Vehicle Mounted
Mobile Meter
Program, Fire Hydrant Meter

Distribution: DI Manual Holders



Application for Fire Hydrant Meter (EXHIBIT A)

(For Office Use Only)

NS REQ	FAC#
DATE	BY

METER SHOP (619) 527-7449

Meter Information

Application Date	Requested Install Date:
------------------	-------------------------

Fire Hydrant Location: (Attach Detailed Map//Thomas Bros. Map Location or Construction drawing.) <u>Zip:</u>	T.B.	G.B. (CITY USE)
Specific Use of Water:		
Any Return to Sewer or Storm Drain, If so, explain:		
Estimated Duration of Meter Use:	<input type="checkbox"/>	Check Box if Reclaimed Water

Company Information

Company Name:			
Mailing Address:			
City:	State:	Zip:	Phone: ()
*Business license#		*Contractor license#	
A Copy of the Contractor's license OR Business License is required at the time of meter issuance.			
Name and Title of Billing Agent: <small>(PERSON IN ACCOUNTS PAYABLE)</small>			Phone: ()
Site Contact Name and Title:			Phone: ()
Responsible Party Name:			Title:
Cal ID#			Phone: ()
Signature:		Date:	
Guarantees Payment of all Charges Resulting from the use of this Meter. Insures that employees of this Organization understand the proper use of Fire Hydrant Meter.			

Fire Hydrant Meter Removal Request	Requested Removal Date:
Provide Current Meter Location if Different from Above:	
Signature:	Title: Date:
Phone: ()	Pager: ()

<input type="checkbox"/>	City Meter	<input type="checkbox"/>	Private Meter
Contract Acct #:		Deposit Amount: \$ 936.00	Fees Amount: \$ 62.00
Meter Serial #		Meter Size: 05	Meter Make and Style: 6-7
Backflow #		Backflow Size:	Backflow Make and Style:
Name:		Signature:	Date:
Fire Station No. 2 (Bayside) Appendix B - Fire Hydrant Meter Program			788 Page

WATER USES WITHOUT ANTICIPATED CHARGES FOR RETURN TO SEWER

Auto Detailing
Backfilling
Combination Cleaners (Vactors)
Compaction
Concrete Cutters
Construction Trailers
Cross Connection Testing
Dust Control
Flushing Water Mains
Hydro Blasting
Hydro Seeing
Irrigation (for establishing irrigation only; not continuing irrigation)
Mixing Concrete
Mobile Car Washing
Special Events
Street Sweeping
Water Tanks
Water Trucks
Window Washing

Note:

1. If there is any return to sewer or storm drain, then sewer and/or storm drain fees will be charges.

Date

Name of Responsible Party
Company Name and Address
Account Number: _____

Subject: Discontinuation of Fire Hydrant Meter Service

Dear Water Department Customer:

The authorization for use of Fire Hydrant Meter # _____, located at (*Meter Location Address*) ends in 60 days and will be removed on or after (*Date Authorization Expires*). Extension requests for an additional 90 days must be submitted in writing for consideration 30 days prior to the discontinuation date. If you require an extension, please contact the Water Department, or mail your request for an extension to:

City of San Diego
Water Department
Attention: Meter Services
2797 Caminito Chollas
San Diego, CA 92105-5097

Should you have any questions regarding this matter, please call the Fire Hydrant Hotline at (619) _____ - _____.

Sincerely,

Water Department

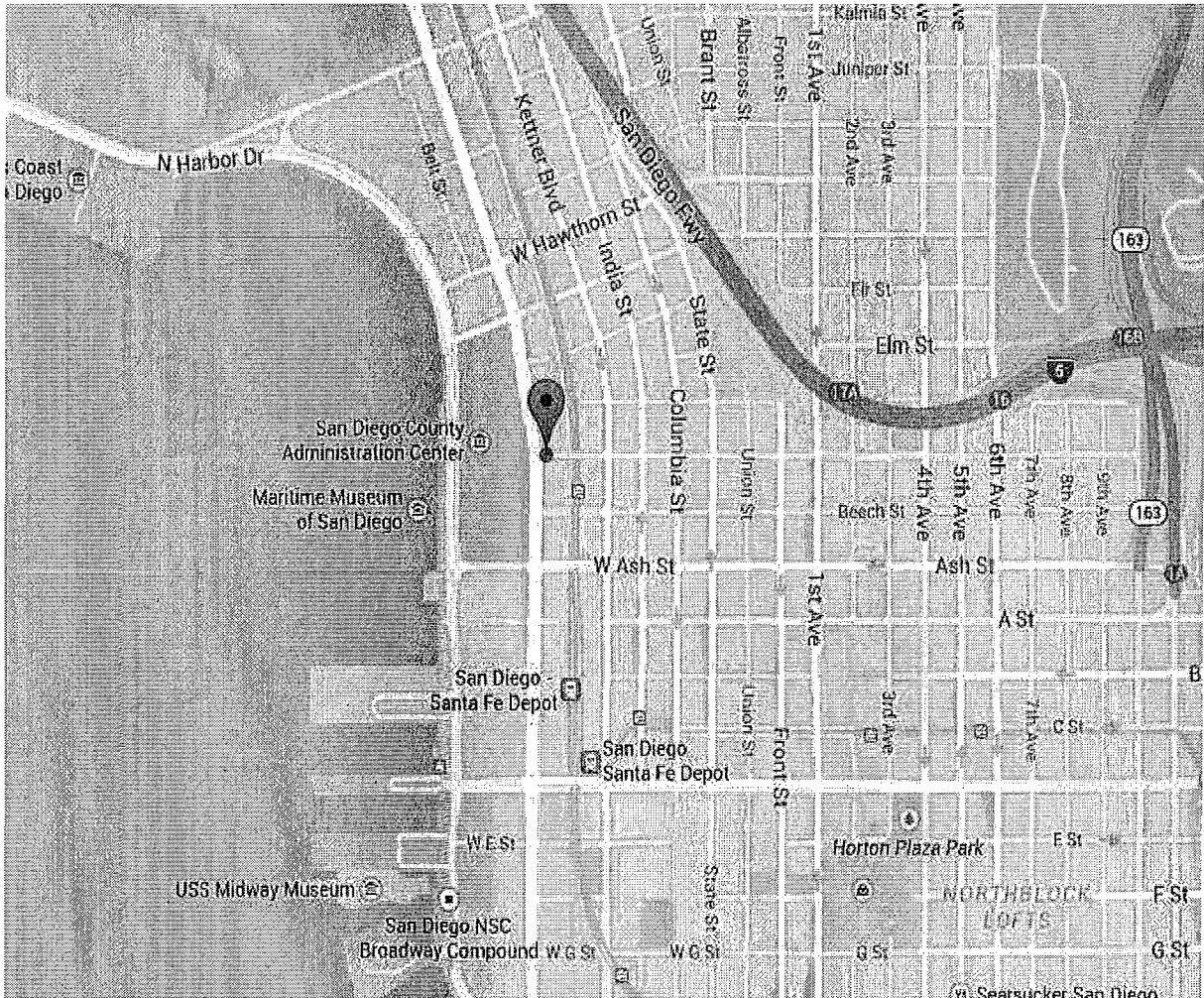
APPENDIX C

MATERIALS TYPICALLY ACCEPTED BY CERTIFICATE OF COMPLIANCE

Materials Typically Accepted by Certificate of Compliance

1. Soil amendment
2. Fiber mulch
3. PVC or PE pipe up to 16 inch diameter
4. Stabilizing emulsion
5. Lime
6. Preformed elastomeric joint seal
7. Plain and fabric reinforced elastomeric bearing pads
8. Steel reinforced elastomeric bearing pads
9. Waterstops (Special Condition)
10. Epoxy coated bar reinforcement
11. Plain and reinforcing steel
12. Structural steel
13. Structural timber and lumber
14. Treated timber and lumber
15. Lumber and timber
16. Aluminum pipe and aluminum pipe arch
17. Corrugated steel pipe and corrugated steel pipe arch
18. Structural metal plate pipe arches and pipe arches
19. Perforated steel pipe
20. Aluminum underdrain pipe
21. Aluminum or steel entrance tapers, pipe downdrains, reducers, coupling bands and slip joints
22. Metal target plates
23. Paint (traffic striping)
24. Conductors
25. Painting of electrical equipment
26. Electrical components
27. Engineering fabric
28. Portland Cement
29. PCC admixtures
30. Minor concrete, asphalt
31. Asphalt (oil)
32. Liquid asphalt emulsion
33. Epoxy

APPENDIX D
LOCATION MAP



Appendix D: Location Map

APPENDIX E
PMP APPROVAL LETTER FROM DEH



County of San Diego

JACK MILLER
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION

ELIZABETH POZZEBON
ASSISTANT DIRECTOR

P.O. BOX 129261, SAN DIEGO, CA 92112-9261
858-505-6700/1-800-253-9933

www.sdcdeh.org

September 8, 2011

Mr. John Collum
Centre City Development Corporation
401 B. Street, 4th Floor
San Diego, CA 92101

Dear Mr. Collum:

WORKPLAN APPROVAL
VOLUNTARY ASSISTANCE PROGRAM (VAP), FILE #H23307-003
BAYSIDE FIRE STATION
1595 PACIFIC HIGHWAY, SAN DIEGO, CA 92101

The County of San Diego, Department of Environmental Health (DEH), Site Assessment and Mitigation Program (SAM), staff reviewed the *Remedial Action and Property Mitigation Plan (PMP)*, dated July 29, 2011, and prepared by Advantage Environmental Consultants, LLC. The PMP includes both a workplan to conduct contaminated soil segregation and management activities during redevelopment of the subject property and a Community Health and Safety Plan.

Prior environmental assessments conducted at the property, a former service station site, revealed petroleum hydrocarbon-impacted soil and groundwater. Investigation of the unauthorized release is currently being addressed under DEH's Local Oversight Program (LOP) as case #H23307-002. In August 2011, Centre City Development Corporation (CCDC), on behalf of the City of San Diego (the property owner), submitted a Voluntary Assistance Program (VAP) application requesting DEH's oversight of contaminated soil management activities related to redevelopment of the property, and was assigned VAP case #H23307-003.

In the PMP, CCDC proposes to demolish the existing improvements at the site and construct a three-story fire station with a one-level subterranean parking garage and basement. The construction will require the excavation and export of approximately 4,000 cubic yards (c.y.) of soil from the site. Of the 4,000 c.y. of excavated soil, an estimated 425 c.y. of lead-impacted soil (exceeding 15 milligrams per kilogram total lead) and 1075 c.y. of petroleum hydrocarbon-impacted soil (with detectable concentrations of total petroleum hydrocarbons and/or volatile organic compounds) will be disposed or treated at off-site regulated facilities. The remaining 2,500 c.y. of clean soil (inert waste) is proposed to be removed from the site under Tier 1 or Tier 2 designations under the San Diego Regional Water Quality Control Board Conditional Waiver No. 8 requirements. Confirmation soil samples will be collected for analysis, and a comprehensive Closure Report will be submitted requesting closure of both the LOP case and the VAP case.

Prior to conducting the soil excavation activities, samples will be collected from the four on-site groundwater monitoring wells and one off-site well. The PMP states that the analytical results will be utilized to complete a human health vapor risk assessment and ascertain whether additional mitigation measures, such as a vapor barrier, will be required. In addition, the future disposition of the monitoring wells will be discussed with DEH/SAM prior to any major site excavation.

"Environmental and public health through leadership, partnership and science"

The PMP is approved, with the following condition:

- In addition to posting the Public Notification Form at various locations around the site perimeter fence, the notification form must be provided to adjacent property owners and occupants.

If you have any questions or concerns, please do not hesitate to contact me at (858) 505-6797.

Sincerely,



TERESA E. SHERMAN, Project Manager
Site Assessment and Mitigation Program

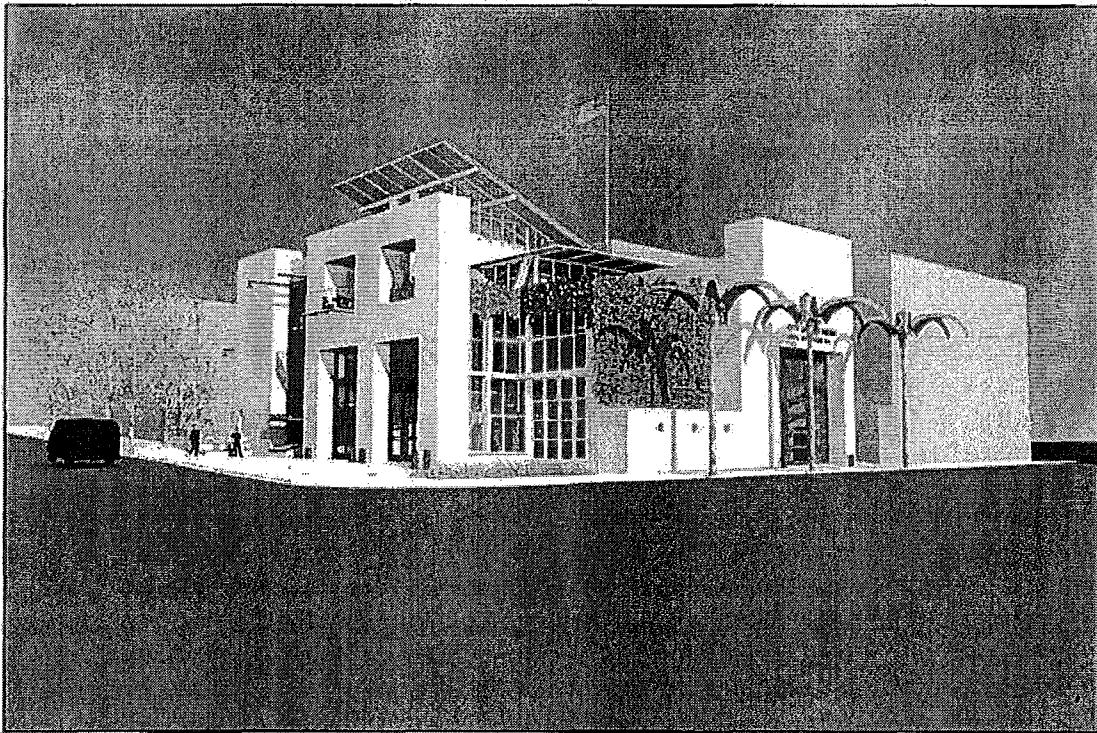
TES/kd

cc: Mr. Jim Barwick, City of San Diego, Real Estates Assets Division
Ms. Olivia Skance, Texaco, Inc./Chevron
Mr. David Allsbrook, Centre City Development Corporation
Linda Beresford, Esq., Oppen & Varco, LLP
Brock Ladewig, Esq., City of San Diego
Michael J. Faulkner, Advantage Environmental Consultants, LLC

WP/H23307-003-911VAPWPA

APPENDIX F
ENVIRONMENTAL SECONDARY STUDY

ENVIRONMENTAL SECONDARY STUDY
FOR THE
FIRE STATION NO. 2 (BAYSIDE)



JUNE 2010

Prepared for: City of San Diego Redevelopment Agency
1200 Third Avenue, 14th Floor
San Diego, CA 92101

Preparation Administered by: Centre City Development Corporation
401 B Street, Suite 400
San Diego, California 92101

Prepared by: AECOM
1420 Kettner Boulevard, Suite 500
San Diego, California 92101

ENVIRONMENTAL SECONDARY STUDY

1. **PROJECT TITLE:** Fire Station No. 2 (Bayside)
2. **APPLICANT:** Centre City Development Corporation, on behalf of the City of San Diego Redevelopment Agency
3. **PROJECT LOCATION:** The project site consists of two approximately 5,000 square foot sites (APN 533 231 01 and APN 533 231 02) for a total of approximately 10,000 square feet (.23 acre) and is located at 1595 Pacific Highway on the southeast corner of the Cedar Street intersection in the Little Italy neighborhood within the Expansion Sub Area of the Centre City Redevelopment Project in downtown San Diego (Figure 1). Centre City includes approximately 1,500 acres of the metropolitan core of San Diego, bounded by Interstate 5 on the north and east and San Diego Bay on the south and southwest. Centre City is located 15 miles north of the United States International Border with Mexico.
4. **PROJECT SETTING:** The Final Environmental Impact Report (FEIR) for the San Diego Downtown Community Plan, Centre City Planned District Ordinance, and Redevelopment Plan for the Centre City Project Area describes the existing setting of Centre City including the neighborhood of Little Italy. This description is hereby incorporated by reference.

Located in the highly urbanized Centre City environment, the project site is currently occupied by a drive-through fast food restaurant at the southeast corner of the Pacific Highway and Cedar Street intersection. Other land uses on the same block include two adjacent buildings (one two-story commercial building and one one-story warehouse), and the Hampton Inn. Specific uses for surrounding blocks include another drive-through fast food restaurant and the Monarch School to the north; the County Administration Building with parking lots and a future park to the west; the railroad/trolley tracks, a parking lot, and the five- to six-story Camden/ Tuscany residential project to the east; and an additional residential development to the south (Figure 2). The project site lies along Cedar Street, a key pedestrian east-west street through Little Italy connecting to the historic County Administration Building property and the bay. The site was primarily selected for the proposed fire station because it is located west of the railroad tracks. Locating a fire station west of the tracks would avoid delays to east/west vehicular traffic that are sometimes caused by rail traffic that passes through downtown.

Applicable plans and policies governing the site include the Centre City Community Plan/Redevelopment Plan (1992) and the Centre City Planned District Ordinance (PDO). Although the newly certified FEIR provides the most recent environmental analysis applicable to the project, the previous versions of the Community Plan and PDO regulations apply to the proposed project because the proposed project site lies within the Coastal Zone, and the State Coastal Commission (CCC) has not yet approved the newest version of the Downtown Community Plan and Centre City PDO at this time. Under the 1992 PDO, the site is located within the Commercial Office land use district, which is intended to accommodate government, business and professional offices, hotels, judicial facilities, and a variety of support commercial services and residential developments. In addition, the site is located within the County Administration Center Design Zone, which established policies to ensure that new development is sympathetic in scale, character, and height to the historical significance of the site. When the 2006 PDO amendments are approved by the CCC (estimated in early 2011), the site will be considered as part of the Employment/Residential Mixed-Use District, which is similar to the Commercial Office District. These previous regulations do not allow any more intense or dense development on the project site than the revised Community Plan and PDO analyzed in the FEIR. The permitted Floor Area Ratio (FAR) for this site is 4.0 and the project proposes 1.6 (note that the 2006 minimum FAR requirements of 2.5 is not yet applicable to this site).

- 5. PROJECT DESCRIPTION:** This Secondary Study analyzes the potential environmental impacts associated with the proposed Fire Station No.2 (Bayside). The proposed project would involve the construction of a three-story fire station with one level of underground parking on a 10,000 square foot site located at the southeast corner of Pacific Highway and Cedar Street. The proposed fire station would consist of an approximately 16,000 square foot structure to accommodate an apparatus bay to house up to three fire vehicles and living and working quarters for the fire crew (Figure 3). The station would house up to 12 personnel, including three fire captains, three fire engineers, and six firefighters. Three of the 12 personnel would be trained paramedics. A single level of below grade parking would provide a total of 16 spaces (Figure 4).

The ground level of the proposed project would contain a drive through apparatus bay that would accommodate up to three engines, trucks, medic, and/or other fire-rescue vehicles (Figure 5). The following fire apparatus vehicles would be assigned to the proposed project:

- One triple combination pumper with a length of 29-32 feet, a width of 10 feet, and a turning radius of 52 feet;
- One aerial ladder truck with a length of 40-60 feet, a width of 10 feet, a height of 12 feet, and a turning radius that varies up to 65 feet; and
- One miscellaneous vehicle (e.g. pumper truck, battalion chief vehicle, ambulance, brush rig, or utility vehicle).

The ground floor would also contain a public lobby and administrative offices. The second floor would contain living and sleeping quarters for the fire crew and a majority of this floor would be open to the apparatus bay below (Figure 6). The third floor would also contain living and sleeping quarters but would also contain an exercise room, kitchen, and dining area (Figure 7). In addition, the proposed project would include a roof deck accessed on the third floor adjacent to the kitchen and dining area (Figure 8). Building vicinity elevations are provided in Figure 9.

The proposed fire station would be accessed via two driveways. The Pacific Highway driveway would be the entry for the fire vehicles and the entrance/exit for the underground parking area. The fire vehicles would exit the site through the Cedar Street driveway, enabling them to head west, then

north or south on Pacific Highway, or east on Cedar Street into the Little Italy neighborhood and the remainder of the downtown planning area.

The proposed project has been designed to achieve LEED Silver rating or above. The building would contain a series of green roofs on the third and roof levels, and would provide an angled roof canopy over an elevated atrium element that would contain photovoltaic panels. The project also proposes to incorporate a "green wall" on a portion of the west elevation where a vine is intended to cascade from the third floor planters down an open mesh screen to provide additional landscaping near the corner of the project and to minimize sun exposure into the apparatus bay.

The project will require approval of a Centre City Coastal/Planned Development permit, as the project site is in the Coastal Zone and is expected to require the following deviations from PDO standards:

1. Allowance of one driveway on Pacific Highway (prohibited under PDO);
2. Increase width of driveway on Cedar Street from 30 to 42 feet;
3. Reduction in the distance of the Cedar Street driveway from the Pacific Highway curb line from 65 to 32 feet; and
4. Increase the total linear feet of the driveway on the site based on the size of the lot (1 foot per 500 square feet) from 20 to 66 feet.

These deviations will be further evaluated as part of the findings for the Planned Development Permit during project review. If approved, construction of the proposed project would begin in late 2011 and would be anticipated to be complete in early 2013.

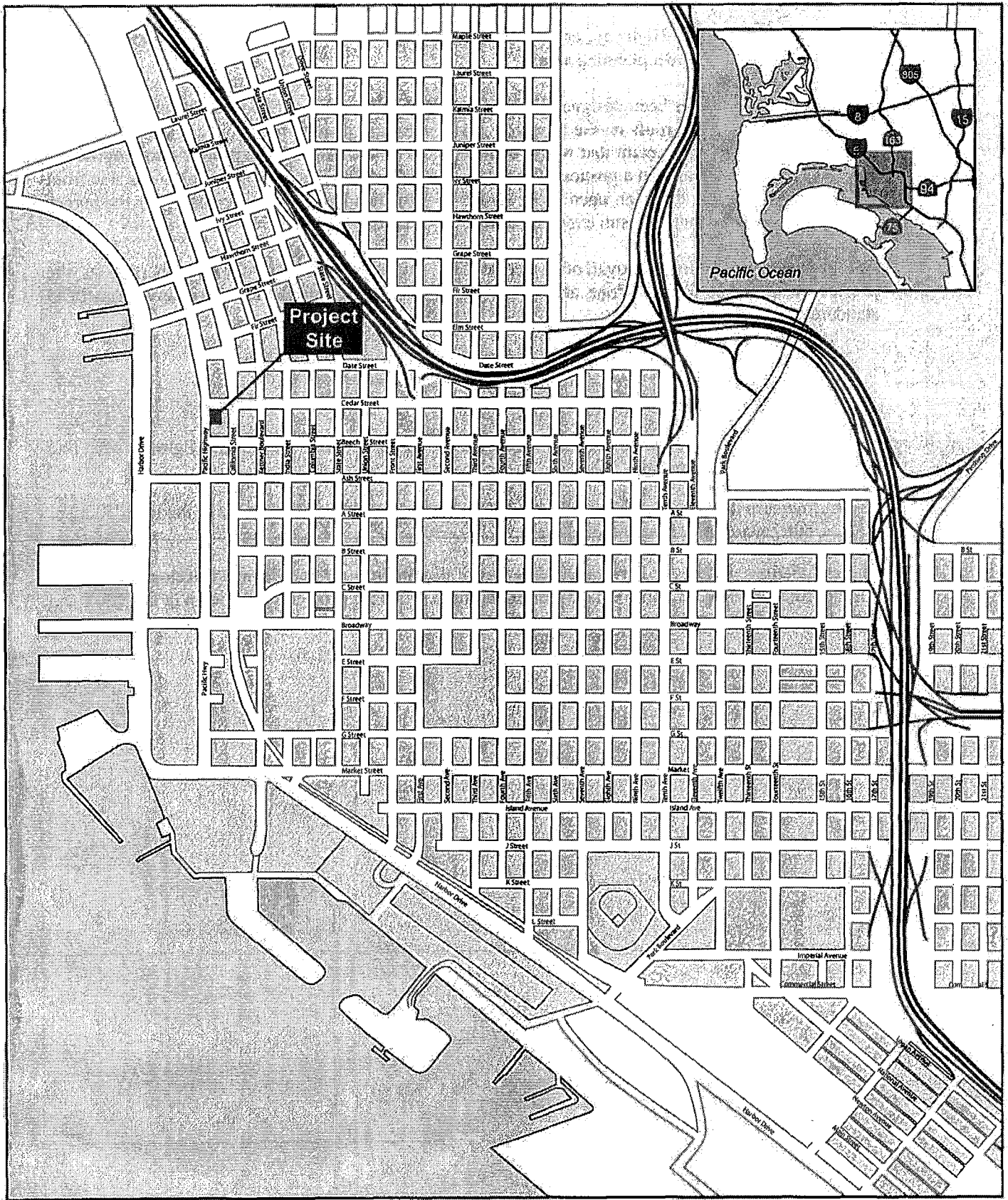
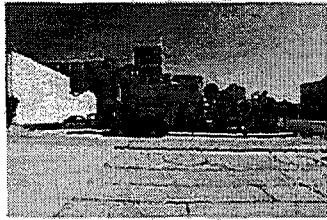


Figure 1
Regional Location and Vicinity

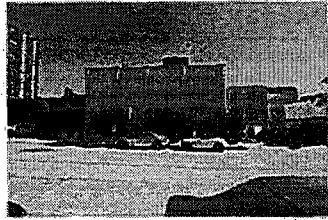
June 2010



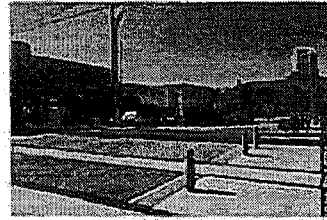
No Scale



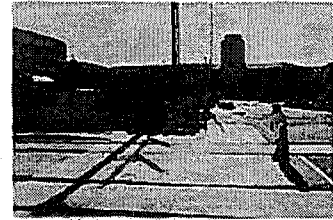
6 VIEW TOWARD SITE FROM ACROSS WEST CEDAR



7 NEIGHBORING BUILDING TO THE EAST



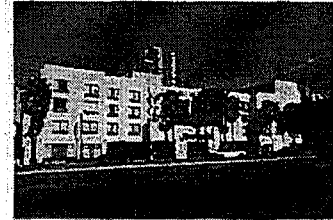
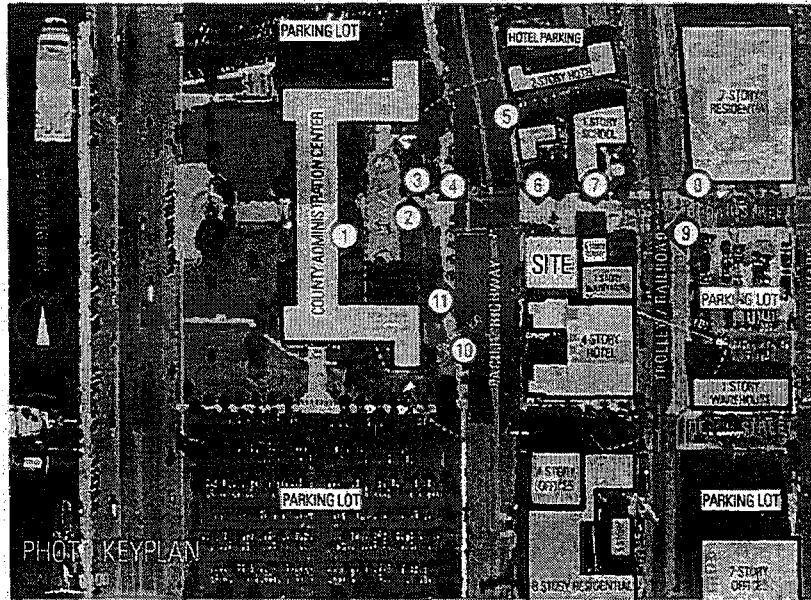
8 VIEW TO SITE FROM NORTHEAST ON CEDAR



9 VIEW TO SITE FROM EAST ON CEDAR



5 VIEW TOWARD SITE FROM NORTH ALONG PAC. HWY



10 NEIGHBORING BUILDING TO THE SOUTH



4 VIEW TOWARD SITE FROM NORTHWEST



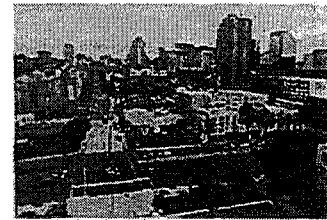
11 VIEW OF SITE ACROSS PACIFIC HIGHWAY



3 VIEW FROM COUNTY ADMINISTRATION PLAZA



2 VIEW FROM COUNTY ADMINISTRATION PLAZA



1 VIEW FROM COUNTY ADMINISTRATION BUILDING

SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

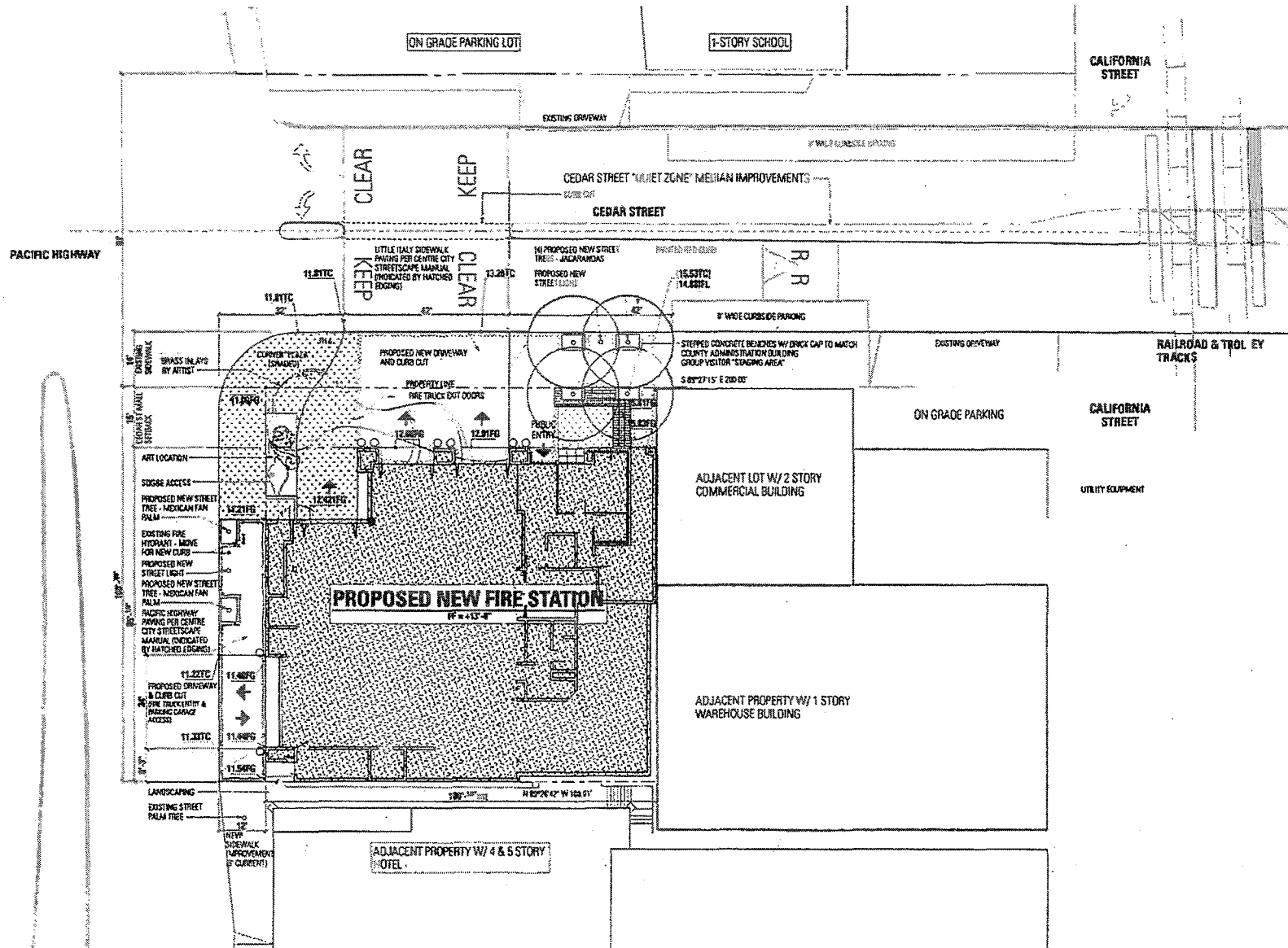
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Fire Station No. 2 (Bayside)
CCDC Secondary Study

Fire Station No. 2 (Bayside) Appendix F – Environmental Secondary Study
Volume 1 of 2 (Rev. July 2015)

Figure 2
Existing and Surrounding Land Uses

June 2010



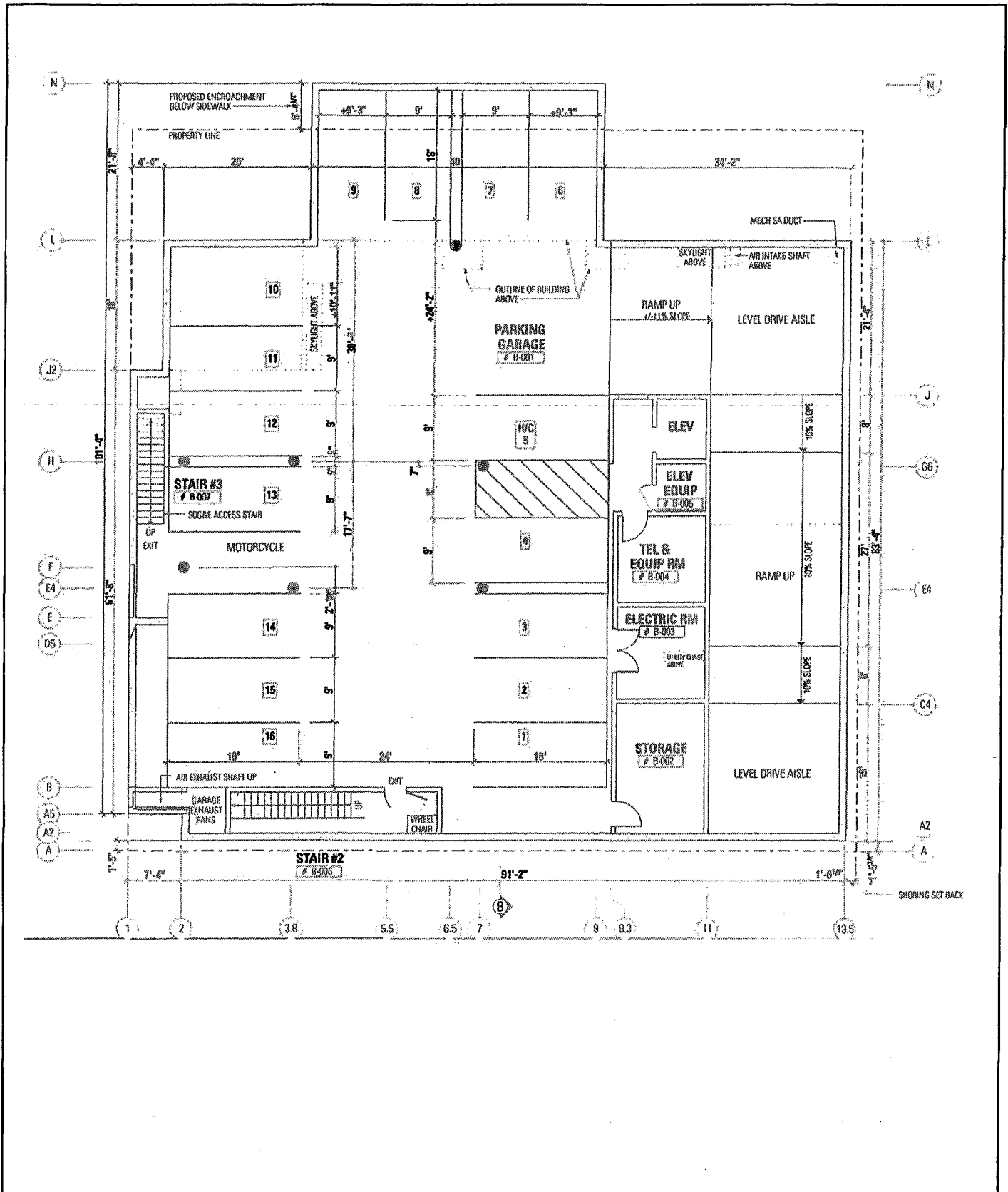
SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

⊕ Not to Scale

Fire Station No. 2 (Bayside)
CCDC Secondary Study

Figure 3
Site Plan

June 2010



SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

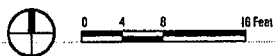
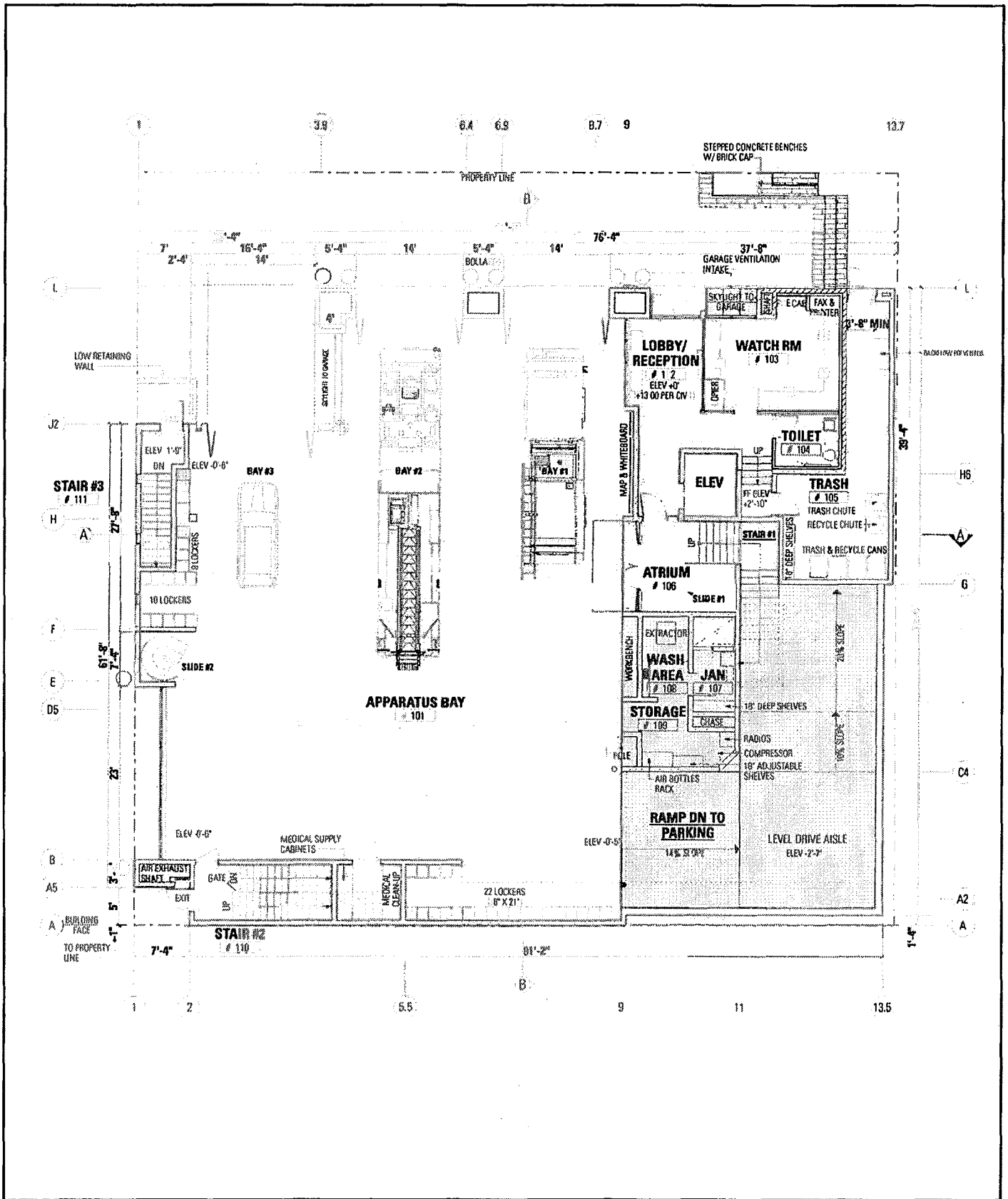


Figure 4
Parking Garage Floor Plan



SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

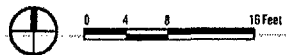
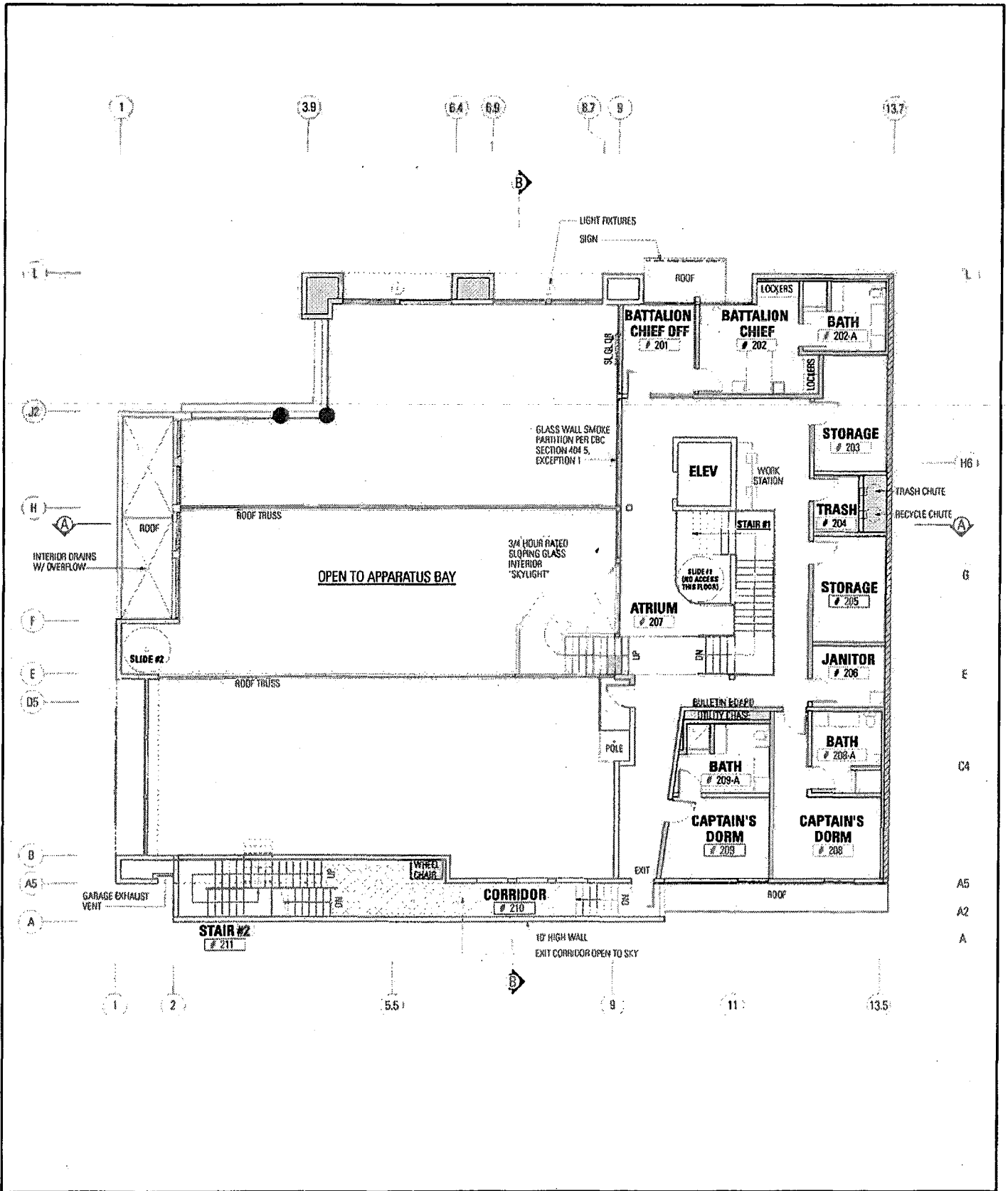


Figure 5
Ground Floor Plan



SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

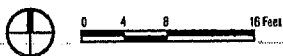
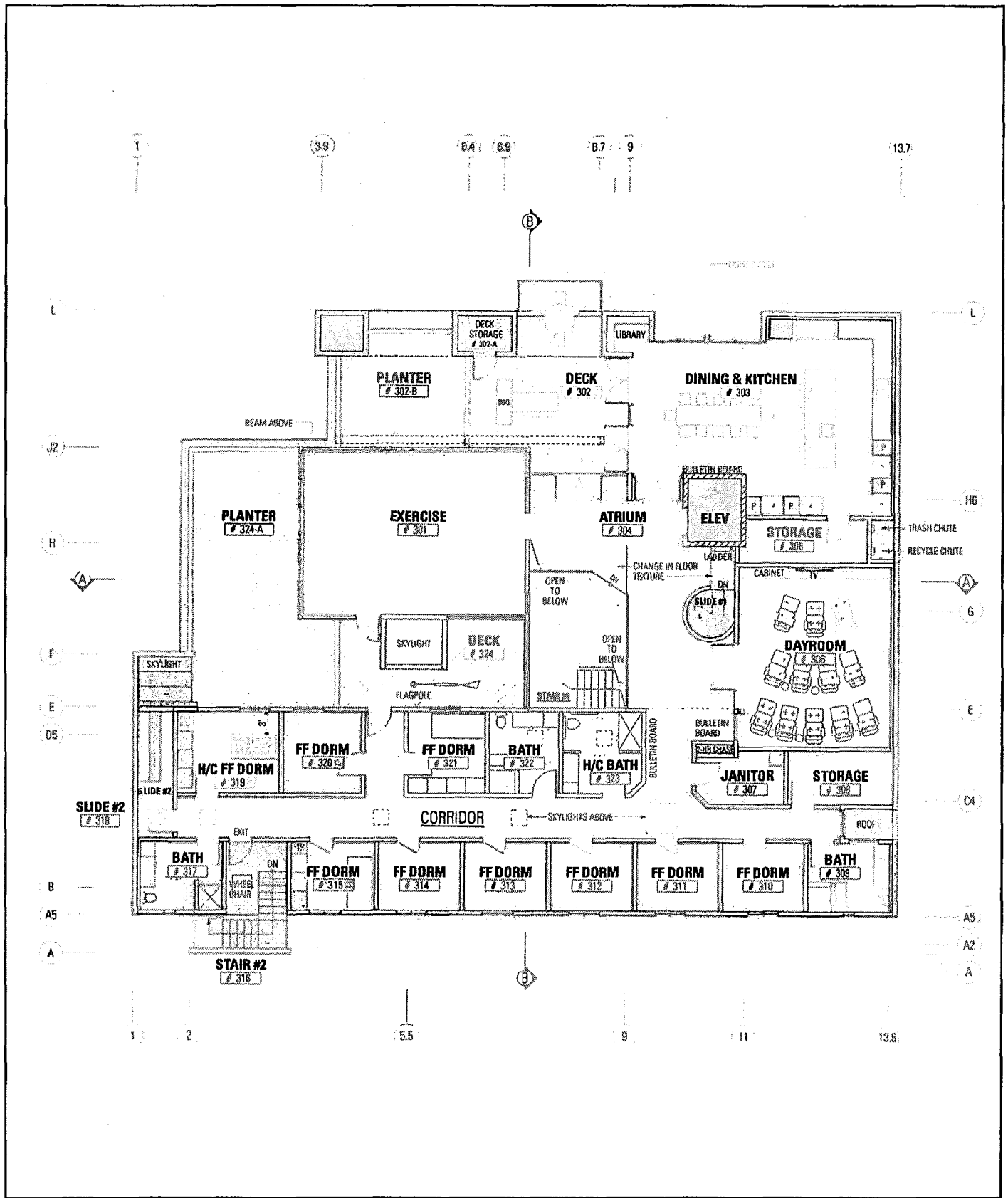
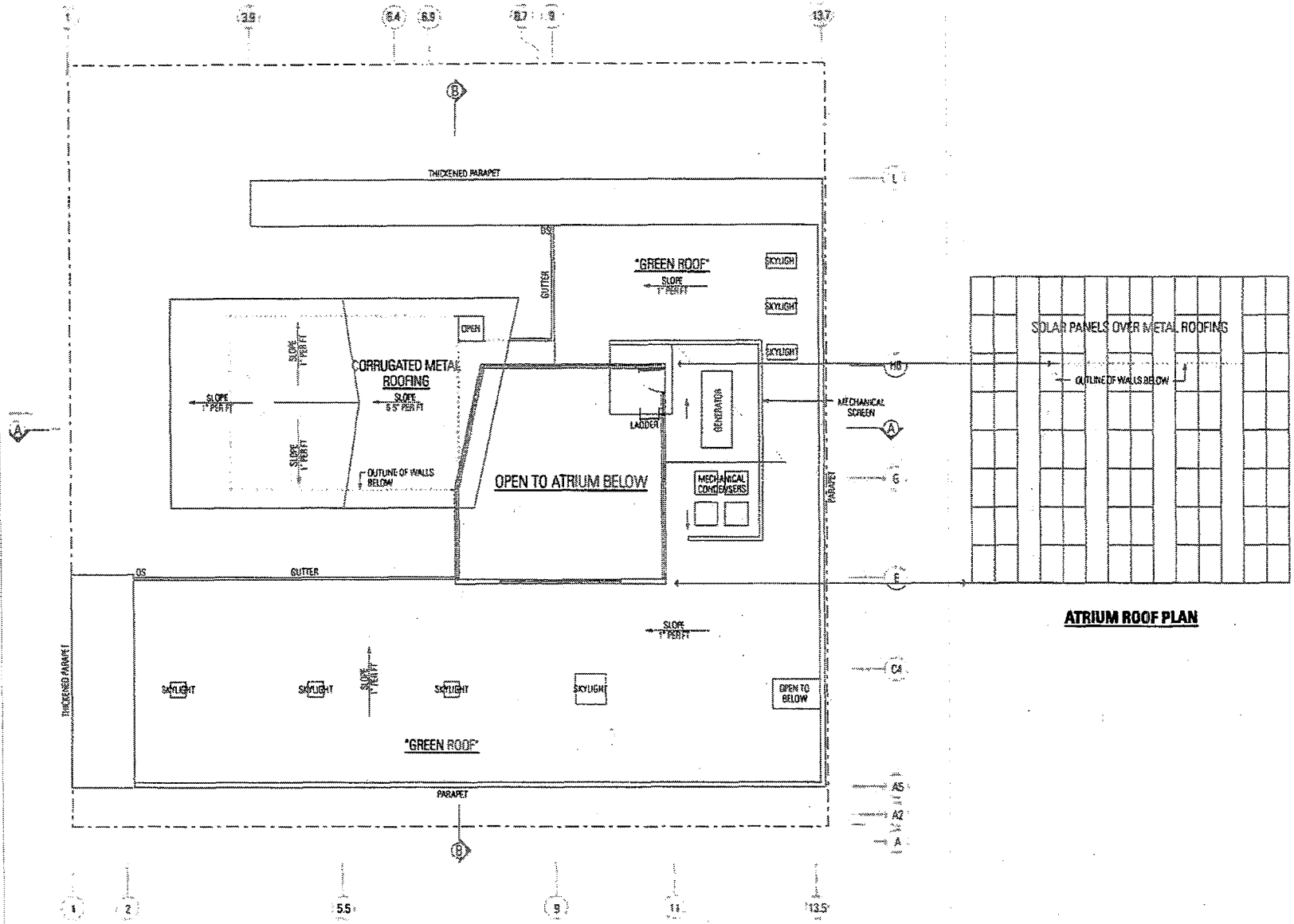


Figure 6
Second Level Floor Plan

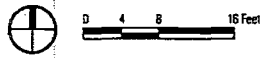


SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

Figure 7
Third Level Floor Plan



SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010



**Figure 8
Roof Plan**

**Fire Station No. 2 (Bayside)
CCDC Secondary Study**

June 2010



SOURCE: Rob Wellington Quigley, FAIA and Don Dommer Associates 2010

⊕ Not to Scale

Figure 9
Vicinity Elevations

Fire Station No. 2 (Bayside)
CCDC Secondary Study

June 2010

6. California Environmental Quality Act (CEQA) COMPLIANCE: The Centre City Redevelopment Project and related activities have been addressed by the following environmental documents, which were prepared prior to this Secondary Study and are hereby incorporated by reference:

Final Environmental Impact Report (FEIR) for the San Diego Downtown Community Plan, Centre City Planned District Ordinance, and 10th Amendment to the Redevelopment Plan for the Centre City Project (State Clearinghouse Number 2003041001, certified by the Redevelopment Agency (Resolution No. R-04001) and the City Council (Resolution No. R 301265) on March 14, 2006.

Addendum to the FEIR for the 11th Amendment to the Redevelopment Plan for the Centre City Redevelopment Project, Amendments to the San Diego Downtown Community Plan, Centre City Planned District Ordinance, Marina Planned District Ordinance, and Mitigation, Monitoring and Reporting Program of the FEIR for the San Diego Downtown Community Plan, Centre City Planned District Ordinance, and the Redevelopment Plan for the Centre City Redevelopment Project certified by the Redevelopment Agency by Resolution R-04193 and by the City Council by R-302932 on July 31, 2007.

Second Addendum to the FEIR for the proposed amendments to the San Diego Downtown Community Plan, Centre City Planned District Ordinance, Marina Planned District Ordinance, and Mitigation Monitoring and Reporting Program certified by the Redevelopment Agency by Resolution R-04508 on April 21, 2010.

Third Addendum to the FEIR for the Residential Emphasis District Amendments to the Centre City Planned District Ordinance certified by the Redevelopment Agency by Resolution R-04510 on April 21, 2010.

The FEIR is a "Program EIR" as described in Section 15168 of the State CEQA Guidelines. The aforementioned environmental documents are the most recent and comprehensive environmental documents pertaining to the proposed project. These environmental documents are available for review at the office of the Centre City Development Corporation, 401 B Street, Suite 400, San Diego, California 92101.

This Secondary Study has been prepared in compliance with the San Diego Redevelopment Agency's amended "Procedures for Implementation of CEQA and the State CEQA Guidelines" (adopted July 17, 1990). Under these Agency Guidelines, environmental review for subsequent specific development projects is accomplished using the Secondary Study process defined in the Agency Guidelines, as allowed by Sections 15168 and 15180 of the State CEQA Guidelines. The Secondary Study includes the same evaluation criteria as the Initial Study defined in Section 15063 of the State CEQA Guidelines. Under this process, the Secondary Study is prepared for each subsequent specific development project to determine whether the potential impacts were anticipated in the FEIR. No additional documentation is required for subsequent specific development projects if the Secondary Study determines that the potential impacts have been adequately addressed in the FEIR and subsequent specific development projects implement appropriate mitigation measures identified in the Mitigation, Monitoring, and Reporting Program (MMRP) that accompanies the FEIR.

If the Secondary Study identifies new impacts or a substantial change in circumstances, additional environmental documentation is required. The form of this documentation depends upon the nature of the impacts of the subsequent specific development project being proposed. Should a proposed project result in: (a) new or substantially more severe significant impacts that are not adequately addressed in the FEIR, or (b) there is a substantial change in circumstances that would require major revision to the FEIR, or (c) that any mitigation measures or alternatives previously found not to be feasible or not previously considered would substantially reduce or lessen any significant effects of the

project on the environment, a Subsequent or Supplement to the EIR would be prepared in accordance with Sections 15162 or 15163 of the State CEQA Guidelines (CEQA Statutes Section 21166). If the lead agency under CEQA finds pursuant to Sections 15162 and 15163, no new significant impacts will occur or no new mitigation will be required, the lead agency can approve the subsequent specific development project, as being within the scope of the project covered by the FEIR, and no new environmental document is required.

7. **PROJECT-SPECIFIC ENVIRONMENTAL ANALYSIS:** See attached Environmental Checklist and *Section 10 Evaluation of Environmental Impacts*.

8. **MITIGATION, MONITORING, AND REPORTING PROGRAM:** As described in the Environmental Checklist and summarized in **Attachment A**, the following mitigation measures included in the MMRP found in Volume 1B of the FEIR will be implemented by the proposed project:

- Air Quality (AQ-B.1-1)
- Historical Resources (HIST-B.1-1)
- Noise (NOI-B.1-1)
- Paleontology (PAL-A.1-1)

9. **DETERMINATION:**

In accordance with Sections 15168 and 15180 of the CEQA Guidelines, the potential impacts associated with future development within the Centre City Redevelopment Project are addressed in the FEIR prepared for the San Diego Downtown Community Plan, Centre City Planned District Ordinance and Tenth Amendment to the Redevelopment Plan for the Centre City Redevelopment Project, which was certified on March 14, 2006 and the Addenda certified thereafter in 2007 and 2010.

These previous documents address the potential effects of future development within the Centre City Redevelopment Project based on buildout forecasts projected from the land use designations, density bonus, and other policies and regulations governing development intensity and density. Based on this analysis, the FEIR and Addenda concluded that development would result in significant impacts related to the following issues (mitigation and type of impact shown in parentheses):

Significant but Mitigated Impacts

- Air Quality: Construction Emissions (AQ-B.1) (Direct (D))
- Land Use: Ballpark Noise (LU-B.1) (D)
- Land Use: Ballpark Lighting (LU-B.5) (D)
- Noise: Interior From Traffic Noise (NOI-B.1) (D)
- Noise: Interior From Ballpark Noise (NOI-B.2) (D)
- Paleontology: Impacts to Significant Paleontological Resources (PAL-A.1) (D)

Significant and Not Mitigated Impacts

- Aesthetics/Visual Quality: Views Of Bay And Bay Bridge (VIS-B.1) (D)
- Air Quality: Construction Emissions (AQ-B.1) (Cumulative (C))
- Air Quality: Mobile-source Emissions (C)
- Historical Resources: Historical (D/C)
- Historical Resources: Archaeological (D/C)
- Land Use: Traffic Noise (LU-B.2) (D)
- Land Use: Aircraft Noise (LU-B.3) (D)
- Land Use: Railroad Noise (LU-B.4) (D)
- Land Use: Physical Changes Related to Transient Activity (LU-B.6) (D/C)

- Noise: Traffic Noise Level Increase on Grid Streets (NOI-A.1) (D/C)
- Noise: Exterior Traffic Noise in Residential Development (NOI-C.1) (D)
- Noise: Exterior Aircraft Noise in Residential Development (NOI-C.2) (D)
- Noise: Exterior Traffic Noise in Public Parks and Plazas (NOI-D.1) (D)
- Noise: Exterior Aircraft Noise in Public Parks and Plazas (NOI-D.2) (D)
- Parking: Excessive Parking Demand (TRF-D.1) (D/C)
- Traffic: Impact on Grid Streets (TRF-A.1.1) (D)
- Traffic: Impact on Surrounding Streets (TRF-A.1.2) (D/C)
- Traffic: Impact on Freeway Ramps and Segments (TRF-A.2.1) (D/C)
- Traffic: Impact from Removal of Cedar Street Ramp (TRF-A.2.2) (D)
- Water Quality: Urban Runoff (WQ-A.1) (C)

In certifying the FEIR and approving the Downtown Community Plan, Planned District Ordinance, and 10th Amendment to the Redevelopment Plan, the San Diego City Council and Redevelopment Agency adopted a Statement of Overriding Considerations, which determined that the unmitigated impacts were acceptable in light of economic, legal, social, technological, or other factors including the following:

Overriding Considerations

- Develop downtown as the primary urban center for the region.
- Maximize employment opportunities within the downtown area.
- Develop full-service, walkable neighborhoods, linked to the assets downtown offers.
- Increase and improve park and public spaces.
- Maximize the advantages of downtown's climate and waterfront setting.
- Implement a coordinated, efficient system of vehicular, transit, bicycle and pedestrian traffic.
- Integrate historical resources into the new downtown plan.
- Facilitate and improve the development of business and economic opportunities located in the downtown area.
- Integrate health and human services into neighborhoods within downtown.
- Encourage a regular process of review to ensure the Plan and related activities are best meeting the vision and goals of the Plan.

The proposed activity analyzed within this Secondary Study is covered under the FEIR for the San Diego Downtown Community Plan, Centre City Planned District Ordinance 1992, and 10th Amendment to the Redevelopment Plan for the Centre City Redevelopment Project, which was certified by the Redevelopment Agency by Resolution R-04001 and by the City Council by Resolution R-301265 on March 14, 2006, and the Addenda certified thereafter in 2007 and 2010.

This activity is adequately addressed in the environmental documents noted above and the Secondary Study prepared for this project reveals there is no change in circumstance, additional information, or project changes to warrant additional environmental review. Because the prior environmental documents adequately covered this activity as part of the previously approved project, this activity is not a separate project for purposes of review under the CEQA pursuant to CEQA Guidelines Sections 15060(c) (3), 15180, and 15378(c).

SUMMARY OF FINDINGS: In accordance with Public Resources Code sections 21166, 21083.3, and CEQA Guidelines sections 15162(a), 15168 and 15183, the following findings are derived from the environmental review documented by this Secondary Study and the 2006 FEIR.

1. No substantial changes are proposed in the Centre City Redevelopment Project, or with respect to the circumstances under which the Centre City Redevelopment Project is to be undertaken as a result of the development of the proposed project, which will require important or major revisions in the 2006 FEIR or Addenda certified thereafter in 2007 and 2010 for the Centre City Redevelopment Project;
2. No new information of substantial importance to the Centre City Redevelopment Project has become available, which was not known or could not have been known at the time the 2006 FEIR for the Centre City Redevelopment Project was certified as complete, and which shows that the Centre City Redevelopment Project will have any significant effects not discussed previously in the 2006 FEIR or Addenda certified thereafter in 2007 and 2010, or that any significant effects previously examined will be substantially more severe than shown in the 2006 FEIR or Addenda certified thereafter in 2007 and 2010, or that any mitigation measures or alternatives previously found not to be feasible or not previously considered would substantially reduce or lessen any significant effects of the project on the environment;
3. No Negative Declaration, Subsequent EIR, or Supplement or Addendum to the 2006 FEIR is necessary or required; and
4. The development of the site will have no significant effect on the environment, except as identified and considered in the 2006 FEIR and Addenda certified thereafter in 2007 and 2010 for the Centre City Redevelopment Project. No new or additional project-specific mitigation measures are required for this project.
5. Uniformly applied development policies or standards previously adopted by the City and/or County of San Diego relating to the identification and remediation of soil contamination will substantially mitigate the site-specific effects associated with the potential soil contamination by previous activities on the proposed project site, and therefore the project site's existing soil conditions are not considered peculiar to the project site, nor is an EIR warranted for the proposed project;
6. The proposed project and its associated activities would not have any new effects that were not adequately covered in the 2006 FEIR or Addenda certified thereafter in 2007 and 2010, and therefore, the proposed project is within the scope of the program approved under 2006 FEIR and Addenda certified thereafter in 2007 and 2010.

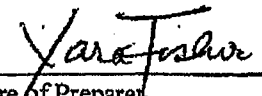
The CCDC, the implementing body for the Redevelopment Agency of the City of San Diego, administered the preparation of this Secondary Study.



 Signature of Lead Agency Representative

6/28/10

 Date



 Signature of Preparer

6/28/2010

 Date

ENVIRONMENTAL CHECKLIST

10. EVALUATION OF ENVIRONMENTAL IMPACTS

This environmental checklist evaluates the potential environmental effects of the proposed project consistent with the significance thresholds and analysis methods contained in the FEIR for the San Diego Downtown Community Plan, Centre City PDO, and Redevelopment Plan for the Centre City Project Area. However, since the application process for the proposed project was submitted prior to adoption of these documents by the State Coastal Commission, the planning policies and regulations applicable to the proposed project are the 1992 Community Plan and PDO. These previous regulations do not allow more intense or dense development, or substantially different types of development on the project site than assumed in the FEIR analysis.

In addition, this environmental checklist also recognizes the requirements of Assembly Bill 32 and Senate Bill (SB) 97. Assembly Bill 32, the California Global Warming Solutions Act, established a state goal of reducing Greenhouse Gas Emissions (GHG) emissions to 1990 levels by the year 2020 (a reduction of approximately 30 percent from forecast emission levels). Senate Bill (SB) 97, a companion bill directed the California Natural Resources Agency (Resource Agency) to certify and adopt guidelines for the mitigation of GHG or the effects of greenhouse gas emissions. SB 97 was the State Legislature's directive to the Resources Agency to specifically establish that GHG emissions and their impacts are appropriate subjects for CEQA analysis.

On December 30, 2009, the Resources Agency adopted revisions to the State CEQA Guidelines (Title 14, California Administrative Code Section 15000 et.seq.) to address analysis and mitigation of pursuant to SB 97. These amendments became effective March 18, 2010. CEQA now requires that public agencies review the environmental impacts of proposed projects. As such, this review includes an analysis of GHG emissions for the proposed project.

Based on the assumption that the proposed activity is adequately addressed in the FEIR and the Addendum to the FEIR, the environmental checklist table indicates how the impacts of the proposed activity relate to the conclusions of the FEIR and the Addendum to the FEIR. As a result, the impacts are classified into one of the following categories:

- Significant and Not Mitigated (SNM)
- Significant but Mitigated (SM)
- Not Significant (NS)

The checklist identifies each potential environmental effect and provides information supporting the conclusion drawn as to the degree of impact associated with the proposed project. As applicable, mitigation measures from the FEIR are identified and are summarized in Attachment A to this Secondary Study. Some of the mitigation measures are plan-wide and not within the control of the proposed project. Other measures, however, are to be specifically implemented by the proposed project. Consistent with the FEIR analysis, the following issue areas have been identified as SNM even with inclusion of the proposed mitigation measures, where feasible:

- Air Quality: Mobile-source Emissions (C)
- Historical Resources: Archaeological (Direct (D)/C)
- Noise: Traffic Noise Level Increase on Grid Streets (NOI-A.1) (C)
- Traffic: Impact on Freeway Ramps and Segments (TRF-A.2.1) (C)
- Water Quality: Urban Runoff (WQ-A.1) (C)

The following Overriding Considerations apply to the proposed project:

- Develop downtown as the primary urban center for the region.
- Develop full-service, walkable neighborhoods linked to the assets downtown offers.
- Facilitate and improve the development of business and economic opportunities located in the downtown area.

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
1. AESTHETICS/VISUAL QUALITY:						
<p>(a) Substantially disturb a scenic resource, vista, or view from a public viewing area, including a State scenic highway or view corridor designated by the Community Plan? Views of scenic resources such as San Diego Bay, San Diego-Coronado Bay Bridge, Point Loma, Coronado and the downtown skyline are afforded by public viewing areas within and around the downtown and along view corridor streets within the planning area. No designated scenic resources exist within the downtown planning area, although, the northern downtown planning area includes an approximately quarter-mile-long portion of the segment of State Route 163 from Ash Street to Interstate 8, which is designated as a California Scenic Highway. This segment of State Route 163 begins at Ash Street approximately 1 mile east of the project site. The proposed project would therefore, not disturb this California Scenic Highway.</p> <p>The proposed project would include the construction of a three-story building located on a parcel at the southeast corner of Pacific Highway and Cedar Street in Little Italy. Visual characteristics of this area include the historic County Administration Building and lawns, a number of new high-rise residential buildings, recently constructed low-to mid-rise residential and mixed-use projects and India Street with its retail shops, restaurants, and galleries.</p> <p>The proposed project site is located on streets (Pacific Highway and Cedar Street) that have been identified as designated view corridors by the FEIR, Downtown Community Plan, and the 1992 PDO. As such, the proposed project would include 15-foot at-grade setbacks along Cedar Street to be in compliance with the requirements of the PDO and the Centre City Community</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
Plan. Setbacks would not be required along Pacific Highway. In addition, views of the San Diego Bay from Cedar Street are already interrupted by the County Administration Building. The proposed fire station would be three stories and would, therefore, not exceed the height of the existing County Administration Building. Furthermore, the FEIR concluded that development in Little Italy pursuant to the Downtown Community Plan would not result in significant impacts to the San Diego Bay. The project site does not possess any significant scenic resources that could be impacted by the proposed project and impacts to on-site scenic resources are not anticipated to be significant. Therefore, no significant direct or cumulative impacts associated with this issue area have been identified.						
(b) Substantially incompatible with the bulk, scale, color and/or design of surrounding development? The bulk, scale, and design of the proposed fire station would be compatible with the existing and planned development of the surrounding area (the Little Italy District). Redevelopment of the site would improve the condition of the site by providing a newly designed and constructed building on a currently underutilized site. The proposed project's bulk and scale would be below that of the County Administration Building to the west and Camden/ Tuscan Residential Project to the east, but slightly above the nearby fast food restaurant and in line with hotel uses nearby. Furthermore, the proposed project is consistent with the policies of the Centre City Community Plan and PDO regarding building bulk and scale. As discussed in the project description, the proposed project would be required to go through the CCDC design review and entitlement process in order to approve deviations from the PDO related to driveway location and size. However, these deviations would not render the proposed project					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
incompatible with the bulk, scale, color and/or design surrounding development. Therefore, the bulk, scale, and design of the proposed project would be compatible with the existing and planned development of the surrounding area. The direct and cumulative visual impacts of the proposed project on surrounding development would not be significant.						
(c) Substantially affect daytime or nighttime views in the area due to lighting? The proposed project would not involve a substantial amount of exterior lighting or include materials that would generate substantial glare. Furthermore, outdoor lighting that would be incorporated into the proposed project would be shielded or directed away so that direct light or glare does not adversely impact adjacent land uses. The City's Light Pollution Law (Municipal Code Section 101.1300 et seq.) also protects nighttime views (e.g., astronomical activities) and light-sensitive land uses from excessive light generated by development in the downtown area. The proposed project's conformance with these requirements would ensure that direct and cumulative impacts associated with this issue are not significant.					X	X
2. AGRICULTURAL RESOURCES						
(a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to non-agricultural use? Centre City is an urban downtown environment that does not contain land designated as prime agricultural soils by the Soils Conservation Service, nor does it contain prime farmlands designated by the California Department of Conservation. Therefore, no direct or cumulative impacts to agricultural resources would occur.					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
(b) Conflict with existing zoning for agricultural use, or a Williamson Act contract? The proposed project site does not contain, nor is it near, land zoned for agricultural use or land subject to a Williamson Act contract pursuant to Section 51201 of the California Government Code. Therefore, no direct or cumulative impacts resulting from conflicts with existing zoning for agricultural use or a Williamson Act contract would occur.					X	X
3. AIR QUALITY						
(a) Conflict with or obstruct implementation of an applicable air quality plan, including the County's Regional Air Quality Strategies or the State Implementation Plan? The proposed project site is located within the San Diego Air Basin, which is under the jurisdiction of the San Diego Air Pollution Control District (SDAPCD). The San Diego Air Basin is designated by state and federal air quality standards as nonattainment for ozone and particulate matter (PM) less than 10 microns (PM ₁₀) and less than 2.5 microns (PM _{2.5}) in equivalent diameter. The SDAPCD has developed a Regional Air Quality Strategy (RAQS) to attain the state air quality standards for ozone. According to the FEIR, development consistent with the Community Plan would not conflict with regional air quality planning, and would be consistent with the RAQS. Therefore, the proposed project would not conflict with or obstruct implementation of applicable air quality plans and no direct or cumulative impacts relative to the obstruction of air quality attainment plans would occur with implementation of the proposed project.					X	X
(b) Expose sensitive receptors to substantial air contaminants including, but not limited to, criteria pollutants, smoke, soot, grime, toxic fumes and substances, particulate matter, or any other emissions that may endanger			X			X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>human health? The proposed project could involve the exposure of sensitive receptors to substantial air contaminants during short-term construction activities and over the long-term operation of the project. Construction activities associated with the project could result in potentially significant impacts related to the exposure of sensitive receptors to substantial emissions of PM. The potential for direct impacts to sensitive receptors during construction activities would be mitigated to below a level of significance through compliance with the City's mandatory standard dust control measures and the dust control and construction equipment emission reduction measures required by FEIR Mitigation Measure AQ-B.1-1 (see Attachment A).</p> <p>The long-term operation of the proposed project could involve the exposure of sensitive receptors to air contaminants including toxic air contaminants (TACs) and substantial concentrations of carbon monoxide (CO) (commonly referred to as CO "hot spots"). However, the FEIR concludes that development within downtown would not expose sensitive receptors to significant levels of any of the air contaminants discussed above. It is also important to note that operation of the proposed project would not necessarily create "new" exposure of sensitive receptors to air contaminants as the project site is currently occupied by a drive-through fast food restaurant and the land use designation of the proposed development is consistent with the Downtown Community Plan land use designation for the site. Therefore, the project would not expose sensitive receptors to substantial air contaminants beyond the level assumed by the FEIR. Therefore, cumulative impacts associated with this issue would not be significant. Project impacts associated with the generation of substantial air contaminants are discussed below in 3.c.</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>(c) Generate substantial air contaminants including, but not limited to, criteria pollutants, smoke, soot, grime, toxic fumes and substances, PM, or any other emissions that may endanger human health? Implementation of the proposed project could result in potentially adverse air quality impacts related to the following air emission generators: construction activities, mobile- and stationary-sources. Demolition of the existing fast-food restaurant, site preparation activities, and construction of the proposed project would involve potentially adverse impacts associated with hazardous building materials, the creation of dust, and the generation of construction equipment emissions. Compliance with the City's existing regulations requiring a pre-construction hazards assessment and strict remediation measures if harmful materials are present would ensure that air quality impacts associated with hazardous building materials are not significant. (See also Section 7a.) However, the clearing, grading, excavation, and construction activities associated with the proposed project would result in dust and equipment emissions that could endanger human health. Implementation of FEIR Mitigation Measure AQ-B.1-1 (see Attachment A) would reduce dust and construction equipment emissions generated during construction of the proposed project to below a level of significance. The air emissions generated by automobile trips associated with long-term operation of the proposed project would not exceed significance standards established by the FEIR. Additionally, construction of the proposed fire station would result in a redistribution of existing emergency calls from other stations in the area and the fire station would likely not be creating new calls for service. However, consistent with the analysis in the FEIR, the project's mobile source emissions, in combination with dust generated during construction of the project, would contribute to the</p>		X	X			

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
significant and unmitigated cumulative impact to air quality identified in the FEIR. The proposed project does not propose any uses that would significantly increase stationary-source emissions in the downtown planning area; therefore, impacts from stationary sources would not be significant.						
4. BIOLOGICAL RESOURCES						
(a) Substantially effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special status species in local or regional plans, policies, or regulations, or by local, state, or federal agencies? Due to the highly urbanized nature of the downtown planning area, there are no sensitive plant or animal species, habitats, or wildlife migration corridors within the area. In addition, the ornamental trees and landscaping included in the proposed project are considered of insignificant value to native wildlife in their proposed location. Therefore, no direct or cumulative impacts associated with this issue would occur.					X	X
(b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations by local, state, or federal agencies? As identified in the FEIR, the proposed project site, as well as the entire downtown planning area, is not within a subregion of the San Diego County Multiple Species Conservation Program However, the proposed project would comply with any applicable local, regional, state, and federal plans, policies and regulations protecting riparian habitat or other sensitive natural communities and species. Therefore, no direct or cumulative impacts associated with substantial adverse effects on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, and regulations by local,					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
state, or federal agencies would not occur.						
5. HISTORICAL RESOURCES						
(a) Substantially impact a significant historical resource, as defined in § 15064.5? According to the FEIR, the proposed project site does not contain any historic or architectural resources. The FEIR does recognize several parcels in the immediate vicinity of the project site as historical resources that are listed in the National Register of Historic Places (NRHP) or designated as Local Historic resources. In the immediate vicinity of the project site, the County Administration Building (located at 1600 Pacific Highway) is identified on the NRHP, and the Star Builders Company (located at 726 West Beech Street) is identified as a locally historic site. The Downtown Community Plan seeks to preserve and protect historic resources, and the FEIR requires mitigation where a historic site or district would be impacted. However, the proposed project would not result in the demolition or substantial alteration of the nearby historical resource sites; therefore, no significant direct or cumulative impacts associated with this issue would occur.					X	X
(b) Substantially impact a significant archaeological resource pursuant to § 15064.5, including the disturbance of human remains interred outside of formal cemeteries? The likelihood of encountering archaeological resources is greatest for projects that include grading and/or excavation of areas on which past grading and/or excavation activities have been minimal (e.g., vacant sites and surface parking lots). Since archaeological resources have been found within inches of the ground surface in the	X	X				

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
downtown planning area, even minimal grading activities can impact these resources. In addition, the likelihood of encountering subsurface human remains during construction and excavation activities, although considered low, is possible. Thus, the excavation, demolition, and surface clearance activities associated with development of the proposed project and the subterranean parking level could have potentially adverse impacts to archaeological resources, including buried human remains. Implementation of FEIR Mitigation Measure HIST-B.1-1 (see Attachment A) would minimize, but not fully mitigate, these impacts. Since the potential for archaeological resources and human remains on the proposed project site cannot be confirmed until grading is conducted, the exact nature and extent of impacts associated with the proposed project cannot be predicted. Consequently, the required mitigation may or may not be sufficient to reduce these direct project-level impacts to below a level of significance. Therefore, impacts associated with this issue remain potentially significant and not fully mitigated, and consistent with the analysis of the FEIR. Furthermore, project-level significant impacts to important archaeological resources would contribute to the potentially significant and unmitigated cumulative impacts identified in the FEIR.						
(c) Substantially impact a unique paleontological resource or site or unique geologic feature? The proposed project site is underlain by the San Diego Formation and Bay Point Formation, which have high paleontological resource potentials. The FEIR concludes that development would have potentially adverse impacts to paleontological resources if grading and/or excavation activities are conducted beyond a depth of 1-3 feet. The proposed project includes one level of subterranean parking would involve excavation approximately 12 feet below grade and therefore would be beyond the FEIR			X	X		

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
standard, resulting in potentially significant impacts to paleontological resources. However, implementation of FEIR Mitigation Measure PALA. 1-1 (see Attachment A) would ensure that the proposed project's potentially direct and cumulative impacts to paleontological resources are less than significant.						
6. GEOLOGY AND SOILS						
<p>(a) Substantial health and safety risk associated with seismic or geologic hazards? The proposed project site is located in a seismically active region and lies within the City of San Diego's Special Study Zone as defined by the City's Seismic Safety Study. As such, a Geotechnical and Fault Investigation Study was prepared by Leighton and Associates, Inc. to address potential seismic and geologic hazards at the project site.</p> <p>The Rose Canyon Fault Zone traverses the downtown planning area and contains two recognized areas of active faulting; the Downtown Graben and the San Diego Fault. The project site is located approximately 5,000 feet west of the mapped northeastern edge of the Downtown Graben, and approximately 2,500 feet northwest of the San Diego Fault. Based on findings from the Geotechnical and Fault Investigation, a "Potentially Active" fault transects the northwest portion of the project site; however, this is not considered an "Active" fault. Due to the absence of active faults at the site, seismic hazards such as surface rupture are considered to be very low (Leighton and Associates, Inc. 2009). It should be noted that the City of San Diego will require geologic mapping throughout the excavation phase of project construction and a "Notice of Geologic and Geotechnical Conditions" must be recorded for the site.</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>In addition, the site is located on the Baypoint Formation and although the potential for geologic hazards (landslides, liquefaction, slope failure, and seismically induced settlement) is considered low due to the site's moderate to non-expansive geologic structure, such hazards could nevertheless occur. Therefore, the potential exists for substantial health and safety risks associated with a seismic hazard. However, conformance with, and implementation of, all seismic-safety development requirements, including City requirements for the Downtown Special Fault Zone, the seismic design requirements of the Uniform Building Code, the City of San Diego Notification of Geologic Hazard procedures, and all other site-specific recommendations set forth in the Geotechnical and Fault Investigation would ensure that the potential impacts associated with seismic and geologic hazards are not significant.</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)

7. GREENHOUSE GAS EMISSIONS

<p>(a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? CCDC has not adopted a recommended methodology for evaluating GHG emissions associated with new development. CCDC recommends that the City of San Diego's guidance titled <i>Addressing Greenhouse Gas Emissions from Projects subject to CEQA</i> (Guidance) be used for analyzing the proposed project's impacts from greenhouse gas (GHG) emissions (City 2010).</p> <p>The City of San Diego (City) does not currently have adopted thresholds of significance for GHG emissions. The City is utilizing the California Air Pollution Control Officers Association (CAPCOA) report "CEQA & Climate Change" dated January 2008 as an interim threshold to determine whether a GHG analysis will be required. A 900 metric ton screening threshold for determining when a GHG analysis is required was chosen based on available guidance from the CAPCOA white paper. The CAPCOA report references the 900 metric ton guideline as a conservative threshold for requiring further analysis and mitigation. This emission level is based on the amount of vehicle trips, the typical energy and water use, and other factors associated with projects. CAPCOA identifies project types that are estimated to emit approximately 900 metric tons of GHG's annually.</p> <p>The proposed project does not fall into an identified category in the Guidance. The Guidance recommends that for project types not listed, an analysis must be performed to show that the project is below the 900 metric ton screening criteria. The analysis should include, at a minimum, the five primary sources of GHG emissions: vehicular traffic, generation of</p>					X	X
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Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>electricity, natural gas consumption/combustion, solid waste generation, and water usage.</p> <p>The proposed project's direct and indirect GHG emissions from the above-mentioned sectors were estimated according to the recommended methodologies from the California Air Resources Board (ARB) and the California Climate Action Registry (CCAR). Direct sources include emissions such as vehicle trips and natural gas consumption. Indirect sources include off-site emissions occurring as a result of the project's operations such as electricity and water consumption. Direct emissions associated with mobile sources were estimated using URBEMIS (Rimpo and Associates 2008). Modeling was based on project-specific data (e.g., size and type of proposed uses) and vehicle trip information from the traffic analysis prepared for this project (LLG 2010). Consumption and generation data for electricity, natural gas, water, and solid waste were estimated using rates from a comparable existing fire station provided by CCDC. GHG emission factors associated with energy consumption were obtained from SDG&E's "2008 Annual Entity Emissions" report to CCAR and the CCAR General Reporting Protocol Version 3.1 (CCAR 2009). Indirect GHG emissions associated with the consumption of water were calculated based on the estimated level of electricity required to convey, treat, and distribute the project's estimated water usage and the aforementioned emission factors for electricity production. Electricity consumption associated with water consumption was estimated using an electricity consumption rate from the CEC's Refining Estimates of Water-Related Energy Use in California report (CEC 2007). GHG emissions from solid waste disposal were calculated using CalRecycle waste characterization data, and emission factors contained in EPA's Waste Reduction Model</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)																
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)															
<p>(WARM).</p> <p>A summary of estimated GHG emissions generated during buildout of the proposed project is presented in Table 1. Refer to Attachment B for a detailed summary of the modeling assumptions, inputs, and outputs.</p> <p style="text-align: center;">Table 1. Summary of Modeled Greenhouse Gas Emissions (CO₂e) from Implementation of the Proposed Project</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Source</th> <th>CO₂e Emissions¹</th> </tr> </thead> <tbody> <tr> <td colspan="2">Operational Emissions at Full Buildout (Year 2013) (metric tons/year)</td> </tr> <tr> <td>Mobile Sources</td> <td>218.3</td> </tr> <tr> <td>Electricity Consumption</td> <td>43.8</td> </tr> <tr> <td>Natural Gas Consumption</td> <td>9.1</td> </tr> <tr> <td>Water Consumption</td> <td>1.8</td> </tr> <tr> <td>Solid Waste Generation</td> <td>1.1</td> </tr> <tr> <td>Total GHG Emissions</td> <td>274.1</td> </tr> </tbody> </table> <p>Notes: CO₂e = carbon dioxide equivalent</p> <p>¹ The values presented do not include the full life cycle of GHG emissions that would occur over the production/transport of materials used during the construction of development envisioned under the Plan or used during the operational life of the project and the end of life for the materials and processes that would occur as an indirect result of the project. Estimating the GHG emissions associated with these processes would be too speculative for meaningful consideration and would require analysis beyond the current state of the art in impact assessment, and may lead to a false or misleading level of precision in reporting operational GHG emissions. Furthermore, indirect emissions associated with in-state energy production and generation of solid waste would be regulated under AB 32 directly at the source or facility that would handle these processes. The emissions associated with off-site facilities in California would be closely controlled, reported, capped, and traded under AB 32 and California ARB programs, as recommended by ARB's Scoping Plan (ARB 2008b). Therefore, it is assumed that GHG emissions associated with these life-cycle stages would be consistent with AB 32 requirements. It should be noted that EPA's WARM model is based on a life-cycle approach, which reflects emissions and avoided emissions upstream and downstream from the point of use. As such, the emission factors provided in the model provide an account of the net benefit of these actions to the environment. However, the WARM model is the most applicable tool to estimate GHG emissions from solid waste disposal at the time of this writing and the emissions are included here for completeness.</p> <p>Source: Modeling performed by AECOM in 2010</p>	Source	CO ₂ e Emissions ¹	Operational Emissions at Full Buildout (Year 2013) (metric tons/year)		Mobile Sources	218.3	Electricity Consumption	43.8	Natural Gas Consumption	9.1	Water Consumption	1.8	Solid Waste Generation	1.1	Total GHG Emissions	274.1					
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Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>As shown in Table 1, the proposed project's GHG emissions would be below the recommended screening threshold of 900 metric tons per year. Thus, the proposed project would not result in significant direct or indirect impacts with respect to GHG emissions and climate change.</p> <p>It is important to note that all CO₂ emissions from project operation may not necessarily be considered "new" emissions. The project site is currently occupied by a drive-through fast food restaurant that generates GHG emissions from the same sources as identified above. Therefore, the net increase in emissions from implementation of the proposed project (Proposed Project Emissions – Existing Emissions) would be less than those reported in Table 1. No reductions in emissions were included to account for the existing use to provide for a conservative analysis. Additionally, construction of the fire station would result in a redistribution of existing emergency calls from other stations in the area and the fire station would likely not be creating new calls for service.</p> <p>The proposed project has also been designed to achieve LEED Silver rating or above. The building would contain a series of green roofs on the third and roof levels, and would provide an angled roof canopy over an elevated atrium element that would contain photovoltaic panels. The project also proposes to incorporate a "green wall" on a portion of the west elevation where a vine is intended to cascade from the third floor planters down an open mesh screen to provide additional landscaping near the corner of the project and to minimize sun exposure into the apparatus bay. This would result in lower emissions from building energy consumption than those reported in Table 1. Therefore, the proposed project would not result in significant</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
direct, indirect, or cumulative impacts with respect to this issue.						
(b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emission of greenhouse gases? Since the project's GHG emissions would fall below the level deemed by CAPCOA and the City of San Diego to be less than significant, implementation of the proposed project would not hinder the State's ability to attain the GHG reduction goals identified in Assembly Bill 32 (the Global Warming Solutions Act). Thus, the proposed project would not result in significant direct, indirect, or cumulative impacts with respect to this issue.					X	X
8. HAZARDS AND HAZARDOUS MATERIALS						
(a) Substantial health and safety risk related to on-site hazardous materials? The proposed project would be located on a site that was historically used as a fueling station (Texaco gasoline station) from the 1940s to the 1960s. Since the 1960s, the site has been redeveloped into several other uses, including a car rental establishment as well as its current use as a fast food restaurant. According to the Limited Phase II Environmental Site Assessment prepared by Ninyo & Moore (2005), petroleum hydrocarbon, lead, and volatile organic compounds impacted soils and groundwater were detected on the site. Due to the presence of contaminated soils, all construction activities are required to conform to the Site Specific Health and Safety Plan (SHSP). In addition, a City of San Diego Fire Prevention Bureau permit was reportedly issued in 1962 for the removal of four underground storage tanks (UST), but documentation to confirm that the USTs were removed cannot be located (i.e., the USTs may still be present and located under the existing structure onsite). If USTs are					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>encountered during grading activities, they must be closed in accordance with the Department of Environmental Health guidelines.</p> <p>Consistent with the uniformly applied development policies and standards identified within the FEIR, if contamination is identified, the County of San Diego Department of Environmental Health (DEH) has a Voluntary Assistance Program, whereby the applicant (or its consultant) can submit a work plan which identifies the manner in which the contamination will be excavated, sampled, and analyzed for waste profiling purposes; transported; and the manner in which it will be disposed. With or without DEH oversight, these activities must comply with all existing waste profiling and disposal laws and regulations. The project's adherence to these uniformly applied development policies and standards will ensure that the impacts associated with this issue are not significant.</p> <p>While the demolition and excavation activities associated with the redevelopment of the project site could result in the exposure of construction workers to hazardous or potentially hazardous materials, adherence to the SHSP, the project-specific recommendations set forth in the Environmental Site Assessment, and existing mandatory federal, state, and local regulations controlling hazardous materials would ensure that impacts associated with this issue are not significant. Therefore, no significant direct or cumulative impacts associated with this issue would occur.</p>						
<p>(b) Be located on or within 2,000 feet of a site that is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>environment? The project site is not located on the State of California Hazardous Waste and Substances Sites (Cortese) List and is not located on or within 2,000 feet of a site on the State of California Hazardous Waste and Substances Sites List. The County of San Diego maintains a Site Assessment Mitigation (SAM) Case Listing of known contaminated sites throughout the County. While no SAM Case Listings exist onsite, there are several sites on the SAM case listing that are within 2,000 feet of the project site. However, none of these exists on or directly adjacent to the project site block, and compliance with regulations will avoid significant impacts to human health and the environment. Additionally, in accordance with the analysis in the FEIR, adherence to existing mandatory federal, state, and local regulations as well as uniformly applied development policies and standards would avoid significant impacts to human health and the environment.</p>						
<p>(c) Substantial safety risk to operations at San Diego International Airport? The proposed project site is within the boundaries of the Airport Influence Area of the Airport Land Use Compatibility Plan (ALUCP) for San Diego International Airport (SDIA). The Airspace Protection guidelines for the project site limit building heights to 350 feet. The proposed project would consist of a three-story building with a maximum building height of 85 feet (60-foot maximum height from above grade to the roof and 85-foot maximum height from above grade to the top of the flagpole). As such, the proposed project would be well within the limits for airspace protection. The project is located within Airport Land Use Compatibility Zone C, or a region outside of the Object Free Area or Sideline Safety Zone. This zone category is used for projects outside of an area where safety is of moderate concern. Therefore, no direct or cumulative impacts associated with this issue are</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
anticipated to occur.						
(d) Substantially impair implementation of an adopted emergency response plan or emergency evacuation plan? The FEIR concludes that development that occurs in accordance with the Downtown Community Plan would not adversely affect implementation of the City of San Diego's Emergency Operations Plan. Since the proposed land use designation of the proposed project under the 1992 Centre City Community Plan is not substantially different from the 2006 Downtown Community Plan land use designation assumed in the FEIR analysis, construction and operation of the proposed project would not affect the City's ability to adequately respond during an emergency. If the proposed fire station is ultimately constructed and operated, this location would likely improve response times to existing and newly developed areas of the western portion of downtown, particularly along Pacific Highway and Harbor Drive. In addition, the project site is located in an area to the west of the train/trolley tracks, thereby avoiding delays to east/west vehicular traffic that are sometimes caused by rail traffic that passes through downtown. Therefore, no direct or cumulatively significant impacts associated with this issue are anticipated.					X	X
8. HYDROLOGY AND WATER QUALITY						
(a) Substantially degrade groundwater or surface water quality? Urban runoff generated within the Downtown Community Plan area is collected by storm drains that eventually discharge into San Diego Bay. San Diego Bay is currently experiencing water quality problems caused by urban development within its watershed. The majority of the proposed project site is currently paved or covered by a structure and redevelopment of the site would not result in an increase in impervious surfaces onsite.		X			X	

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>Construction activities onsite could result in groundwater discharge of runoff, which would contribute in a cumulative nature to the water quality impacts to San Diego Bay; however, existing mitigation as described under the FEIR including Waste Discharge Permits required for groundwater discharge during construction would apply to the project and no greater impacts than that previously analyzed are expected to occur. Implementation of Best Management Practices required by the City's Standard Urban Storm Water Mitigation Program would likely reduce the project's urban runoff contribution below the present level. In addition, Waste Discharge Permits required for groundwater discharge during construction would ensure that impacts to groundwater quality are not significant.</p> <p>Further, the proposed project would conform to the design recommendations in the Limited Phase II Environmental Site Assessment prepared by Ninyo and Moore (2005) pertaining to groundwater and the project foundation and subterranean walls would prevent leakage from or contamination to the groundwater layer. Construction dewatering activities would require treatment prior to discharge under the City's National Pollution Discharge Elimination System. Direct impacts associated with groundwater and surface water quality would not be significant.</p> <p>Although the proposed project would not result in direct impacts to water quality, the FEIR concluded that the water quality of San Diego Bay is already impacted, and the addition of any pollutants in urban runoff discharged to the Bay would result in a cumulatively significant impact. Thus, the project's incremental contribution to the discharge of polluted urban runoff into San Diego Bay, when viewed in connection with polluted runoff discharged into San Diego Bay by past, existing, and reasonably foreseeable future</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
projects, is considered a significant cumulative impact. No mitigation other than adhering to existing regulations has been identified to feasibly reduce this impact to below a level of significance. Consistent with the FEIR, the cumulative water quality impact would remain significant and not mitigated.						
(b) Substantially increase impervious surfaces and associated runoff flow rates or volumes? The proposed project is located on a site that is currently developed and covered with impervious surfaces. Implementation of the proposed project would result in impervious surfaces similar to those that exist onsite. In addition, the proposed project has also been designed to achieve LEED Silver rating or above. The building would contain a series of green roofs on the third and roof levels, and would provide an angled roof canopy over an elevated atrium element that would contain photovoltaic panels. The project also proposes to incorporate a "green wall" on a portion of the west elevation where a vine is intended to cascade from the third floor planters down an open mesh screen to provide additional landscaping near the corner of the project and to minimize sun exposure into the apparatus bay. Incorporation of these features would reduce the amount of runoff from the proposed project. Therefore, the redevelopment of the proposed site would not substantially increase the runoff volume entering the storm drain system and the proposed project would not substantially increase the runoff volume or pollutant concentration entering the storm drain system since the amount of impervious surfaces and, consistent with the analysis of the FEIR., direct and cumulative impacts associated with this issue are not significant.					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
(c) Substantially impede or redirect flows within a 100-year flood hazard area? The proposed project is located on a site is not within a 100-year floodplain. Similarly, the proposed project would not affect off-site flood hazard areas, as no 100-year floodplains are located downstream. Therefore, direct and cumulative impacts associated with this issue are not significant.					X	X
(d) Substantially increase erosion and sedimentation? The proposed project is located on a site that is currently developed with impervious surfaces. The hydrology of the proposed site would not be substantially altered by implementation of the proposed project as the site would maintain a similar quantity of impervious surfaces and, therefore, the proposed project would not substantially increase the long-term potential for erosion and sedimentation. However, the potential for erosion and sedimentation could increase during the short-term during site preparation, excavation and other construction activities. The proposed project's compliance with regulations mandating the preparation and implementation of a Storm Water Pollution Prevention Plan would ensure that impacts associated with erosion and sedimentation are not significant. Therefore, no direct or cumulative impacts associated with this issue are anticipated.					X	X
9. LAND USE AND PLANNING						
(a) Physically divide an established community? The proposed project would not have a footprint that exceeds one block and does not propose any features or structures that would physically divide an established community. Redevelopment of the project site would maintain the street grid and would implement design features to help integrate the structure with the surroundings. Therefore, no direct or cumulative impacts associated with this issue are					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
anticipated.						
<p>(b) Substantially conflict with the City's General Plan and Progress Guide, Downtown Community Plan, Centre City PDO or other applicable land use plan, policy, or regulation? The proposed project is located on a site within the Commercial/Office District under the 1992 PDO, which is intended to accommodate government, business and professional offices, hotels, judicial facilities, and a variety of support commercial services and residential development. An allowable base Floor Area Ratio (FAR) of 4.0 applies to this site. The proposed project would result in the development of a three-story fire station totaling approximately 16,000 square feet on a 10,000- square foot site. This would result in a total building FAR of 1.6, which is below the maximum permissible FAR of 4.0 allowed for this site. Under the 1992 PDO, no minimum off-street parking requirements shall apply to fire stations within Centre City; however, the proposed project would provide 16 parking stalls (15 standard and 1 van-accessible) in one underground parking level.</p> <p>As discussed in 7.c, the proposed project is within the jurisdiction of the ALUCP for SDIA; however, the proposed project would result in the construction of a building that would be no more than three stories in height, it is well within the limits for airspace protection. Therefore, impacts associated with this issue are not anticipated to occur. The proposed project would comply with the goals and requirements of the Downtown Community Plan and would meet all applicable standards of the PDO if the findings for approval of the PDP for the driveway deviations are met. Therefore, no significant direct or cumulative impact associated with an adopted land use plan would occur.</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>(c) Substantial incompatibility with surrounding land uses? Sources of land use incompatibility include noise, lighting, shading, and industrial activities. It is not anticipated that construction of the proposed project would result in, or be subject to, adverse impacts due to substantially incompatible land uses, with the exception of noise. Compliance with the City's Light Pollution Ordinance would ensure that land use incompatibility impacts related to the proposed project's emitting of, and exposure to, lighting are not significant. Existing mandatory local, state, and federal regulations controlling industrial activities would ensure that if a fire station were to be constructed and operated at the project site, it would not be vulnerable to potential land use compatibility impacts resulting from its proximity to nearby industrial activities.</p> <p>As discussed in the FEIR, a portion of Pacific Highway from Cedar to Beech Street within the vicinity of the proposed project would exceed 70 dB(A) CNEL. Potential impacts associated with the project's incompatibility with traffic noise on adjacent grid streets and railroad noise are likely to occur; these potential noise impacts are discussed in detail in Section 11(b). As discussed in the 2006 FEIR, noise levels from train and trolley operations do not exceed the exterior noise standard of 65 dBA CNEL and would, therefore, not result in significant impacts. Additionally, the FEIR states that diesel train engines may produce short-term noise levels of 85 dBA but concludes that the duration of these events is not sufficient to create a measurable noise constraint. Horns and crossing bells are categorized as "nuisance" noise within the 2006 FEIR. Noise from these sources can reach up to 95 dBA at a distance of 50 feet. While these nuisance noises would likely be heard intermittently at the proposed project site, they would not serve to exceed the 70 dBA</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>CNEL standard at the proposed project site on a consistent basis. In addition, the proposed fire station is located in a downtown, urban environment adjacent it the trolley and train, which contribute short-term intermittent noise events to the area. Although the proposed fire station would add an additional noise element to the environment (i.e., sirens), it would be providing an essential public service. In addition, these are required emergency signaling devices which are exempt under the City's Noise Ordinance which states the following:</p> <ul style="list-style-type: none"> • Nothing in this section shall apply to authorized emergency vehicles when being used in emergency situations, including the blowing of sirens and/or horns. (New Sec. 59.5.0402 Motor Vehicles - Added 9-22-76 by O-11916 N.S. - formerly Sec. 59.5.0403.) <p>The operational activities of the proposed project would be properly addressed by the conditions placed on the project. These conditions would minimize potential incompatibilities associated with lighting, and industrial activities, and no significant direct or cumulative impacts associated with this issue are anticipated.</p>						
<p>(d) Substantially impact surrounding communities due to sanitation and litter problems generated by transients displaced by downtown development? Because the project involves the redevelopment of an existing site with no impact to development off-site, and because transients are not known to currently congregate on site, the project will not contribute in a direct or cumulative manner to the impact of sanitation and litter problems generated by displaced transients.</p>					X	X
10. MINERAL RESOURCES						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
(a) Substantially reduce the availability of important mineral resources? The FEIR concludes that the viable extraction of mineral resources is limited in Centre City due to its urbanized nature and the fact that the area is not designated as having high mineral resource potential. Therefore, no direct or cumulative impacts associated with this issue would occur.					X	X
11. NOISE						
(a) Substantial noise generation? Short-term construction noise impacts would be avoided by adherence to construction noise limitations imposed by the City's Noise Abatement and Control Ordinance. The FEIR defines a significant long-term traffic noise increase as an increase of at least 3.0 dBA CNEL for street segments already exceeding 65 dBA CNEL. The FEIR identified nine segments in the downtown planning area that would be significantly impacted as a result of traffic generation. One of those nine segments (Pacific Highway from Cedar Street to Beech Street) directly borders the project site to the west. The FEIR further states that the Pacific Highway segment would experience and individually significant increase (+5.4 dBA CNEL) with implementation of the Downtown Community Plan. The FEIR concludes that there are no feasible mitigation measures available to reduce the significant increase in noise on affected roadways and this impact remains significant and unavoidable.	X	X				
(b) Substantial exposure of required outdoor residential open spaces or public parks and plazas to noise levels (e.g., exposure to levels exceeding 65 dBA CNEL)? The FEIR indicates that traffic noise levels on an identified street segment bordering the project site (Pacific Highway from Cedar Street to Beech Street) would exceed the exterior noise level standard of 65 dBA CNEL for required outdoor residential open spaces. The proposed project would accommodate					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>the living and working needs of fire personnel while they are on duty and would be required to meet the interior noise standards for residential uses. While it is likely that a fire station would have an outdoor space for fire personnel, it would not be considered required open space, and would therefore not be subject to further noise mitigation. Additionally, the FEIR indicates that hourly average noise levels from the train and trolley operations do not exceed the exterior noise standard of 70 dBA CNEL and would, therefore, not result in significant impacts. As described in the FEIR, diesel train engines that travel immediately east of the project site may produce short-term noise levels of 85 dBA but concludes that the duration of these events is not sufficient to create a measurable noise constraint. Horns and crossing bells are categorized as "nuisance" noise within the 2006 FEIR. Noise from these sources can reach up to 95 dBA at a distance of 50 feet. While these nuisance noises would likely be heard at the proposed project site, they are short term and would not serve to exceed the 70 dBA CNEL hourly average standard at the proposed project site. In addition, the proposed fire station is located in a downtown, urban environment adjacent it the trolley and train, which contribute short-term intermittent noise events to the area. Although the proposed fire station would add an additional noise element to the environment (i.e., sirens), it would be providing an essential public service. In addition, these are required emergency signaling devices which are exempt under the City's Noise Ordinance which states the following:</p> <ul style="list-style-type: none"> • Nothing in this section shall apply to authorized emergency vehicles when being used in emergency situations, including the blowing of sirens and/or horns. (New Sec. 59.5.0402 Motor Vehicles - Added 9-22-76 by O-11916 N.S. - formerly Sec. 						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>59.5.0403.)</p> <p>Therefore, since the project does not contain required residential open spaces, or public parks or plazas, and because noise from emergency vehicles are exempt under the City's Noise Ordinance, direct and cumulative impacts associated with this issue are not significant.</p>						
<p>(c) Substantial interior noise within habitable rooms (e.g., levels in excess of 45 dBA CNEL)?, The proposed project would accommodate the living and working needs of fire personnel while they are on duty and would be required to meet the interior noise standards for residential uses. As stated in the FEIR, prior to approval of a building permit for any residential, hospital, or hotel (habitable rooms) within 475 feet of the centerline of Interstate 5 or adjacent to a roadway carrying more than 7,000 ADT (i.e., Pacific Highway between Cedar and Beech), an acoustical analysis shall be performed to confirm that architectural or other design features are included which would assure that noise levels within habitable rooms would not exceed 45 dB(A) CNEL. Implementation of Mitigation Measure NOI-B.1-1 would reduce the impacts associated with interior noise in habitable rooms to a level less than significant. Therefore, project-level impacts associated with this issue are anticipated to be less than significant with mitigation. Cumulative impacts associated with this issue would not occur.</p>			X		X	
12. POPULATION AND HOUSING						
<p>(a) Substantially induce population growth in an area? Redevelopment of the project site is consistent in land use with the Downtown Community Plan. The primary purpose of the project site's redevelopment is to provide increased fire protection for downtown businesses and residents. The project would not induce growth to exceed that analyzed</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
throughout the FEIR and this Secondary Study. Therefore, additional impacts associated with this issue would not occur.						
(b) Substantial displacement of existing housing units or people? Redevelopment of the project site is consistent in land use with the Downtown Community Plan and would provide increased fire protection services to downtown businesses and residents. Adverse physical changes associated with the population growth generated by the proposed project would not exceed those analyzed throughout the FEIR and this Secondary Study. No existing housing units are on site or would be affected by the development or operation of the proposed project. Overall displacement of existing housing units or persons would not occur as a result of the proposed project, and the construction of replacement housing would not be required. Impacts associated with this issue would not occur.					X	X
13. PUBLIC SERVICES AND UTILITIES:						
(a) Substantial adverse physical impacts associated with the provision of new schools? The FEIR concludes that the additional student population anticipated at buildout of downtown would require the construction of at least one additional school. The population of school-aged children attending public schools is dependent upon current and future residential development. The proposed project would provide habitable rooms for fire personnel and would not provide living accommodations for school-aged children. Since the accepted method for student population generation is rooted in residential development and the proposed project does not include residential uses for school-aged children, the proposed project would not generate a sufficient number of students to warrant construction of a new school facility. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>(b) Substantial adverse physical impacts associated with the provision of new libraries? The FEIR concludes that, cumulatively, development in the downtown would generate the need for a new Main Library and possibly several smaller libraries within the downtown. In and of itself, the proposed project would not generate additional demand necessitating the construction of new library facilities. However, according to the analysis in the FEIR, the proposed project is considered to contribute to the cumulative need for new library facilities in the downtown identified in the FEIR. Nevertheless, the specific future location of these facilities (except the Main Library) is unknown at present time. Pursuant to Section 15145 of CEQA, analysis of the physical changes in the downtown planning area, which may occur from future construction of these public facilities, would be speculative and no further analysis of their impacts is required (The environmental impacts of the Main Library were analyzed in a Secondary Study prepared by CCDC in 2001). Construction of any additional library facilities would be subject to CEQA. Environmental documentation prepared pursuant to CEQA would identify potentially significant impacts and appropriate mitigation measures. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.</p>					X	X
<p>(c) Substantial adverse physical impacts associated with the provision of new fire protection/emergency facilities? The FEIR does not conclude that the cumulative development of the downtown area would generate additional demand necessitating the construction of new fire protection/emergency facilities. However, through the collective efforts of the City, the Redevelopment Agency, and CCDC, two sites for new fire stations have been secured in the downtown area; one of which is the proposed Fire Station No. 2 (Bayside). The proposed</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
project would serve to further improve and enhance the current fire protection services in the downtown area. Potential impacts associated with the proposed project are discussed throughout this Secondary Study. The proposed project would not result in direct or cumulative impacts associated with the provision of new fire protection/emergency services beyond those analyzed within this Secondary Study.						
(d) Substantial adverse physical impacts associated with the provision of new law enforcement facilities? The FEIR analyzes impacts to law enforcement service resulting from the cumulative development of the downtown and concludes that the construction of new law enforcement facilities would not be required. Since the land use designation of the proposed development is consistent with the Downtown Community Plan land use designation for the site, the project would not generate a level of demand for law enforcement facilities beyond the level assumed by the FEIR. However, the need for a new facility could be identified in the future. Pursuant to Section 15145 of CEQA, analysis of the physical changes in the downtown planning area, which may occur from future construction of law enforcement facilities, would be speculative and no further analysis of their impacts is required. However, construction of new law enforcement facilities would be subject to CEQA. Environmental documentation prepared pursuant to CEQA would identify potentially significant impacts and appropriate mitigation measures. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.					X	X
(e) Substantial adverse physical impacts associated with the provision of new water transmission or treatment facilities? The FEIR concludes that new water treatment facilities would not be required to address the cumulative development of the downtown. In addition, water					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
pipe improvements that may be needed to serve the proposed project are categorically exempt from environmental review under CEQA as stated in the FEIR. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.						
(f) Substantial adverse physical impacts associated with the provision of new storm water facilities? The FEIR concludes that the cumulative development of the downtown would not impact the existing downtown storm drain system. Since implementation of the proposed project would result in impervious surfaces similar to the existing use of the site, the amount of runoff volume entering the storm drain system would not increase. The proposed project is designed to be LEED Silver certified and would include design elements that would increase the amount of surface area absorption and would, through controlled diversion, assist in the prevention of storm water runoff to ground-level storm water system drains and localized flooding on nearby streets. Therefore, the proposed project would not create demand for new storm water facilities. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.					X	X
(g) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed? California Water Code Section 10910 requires projects analyzed under CEQA to assess water demand and compare that finding to the jurisdiction's projected water supply. The proposed project does not require the preparation of a Water Supply Assessment (WSA) as it does not meet any of the thresholds established by SB 610 or SB 221. According to the FEIR, in the short term, planned water supplies and transmission or treatment facilities are adequate. Expansion of the Alvarado Water Treatment Plant (construction scheduled to be					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>complete in Winter 2010) would also provide increased capacity for treating water supply for the downtown area. Water transmission infrastructure necessary to transport water supply to the downtown area is already in place. Potential direct impacts would not be significant. However, buildout of the 2006 Downtown Community Plan would generate 1.4% more water demand than planned for in the adopted 2005 UWMP. This additional demand was not considered in SDCWA's Urban Water Management Plan (UWMP). To supplement this and meet the additional need, SDCWA indicates that it will have a local water supply (from surface water, water recycling, groundwater, and seawater desalination) to meet the additional demand resulting from buildout of the Downtown Community Plan. In accordance with the conclusion in the FEIR, this additional demand would not represent a substantial increase in the challenge of meeting the otherwise anticipated demand for water within the SDCWA service area. Since the proposed project does not meet the requirements of SB 610 and is consistent with the Downtown Community Plan, direct and cumulative impacts related to water supply would be considered not significant.</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>(h) Substantial adverse physical impacts associated with the provision of new wastewater transmission or treatment facilities? The FEIR concludes that new wastewater treatment facilities would not be required to address the cumulative development of the downtown. In addition, sewer improvements that may be needed to serve the proposed project are categorically exempt from environmental review under CEQA as stated in the FEIR. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.</p>					X	X
<p>(i) Substantial adverse physical impacts associated with the provision of new landfill facilities? The FEIR concludes that cumulative development within the downtown planning area would increase the amount of solid waste sent to the Miramar Landfill and contribute to the eventual need for an alternative landfill. The proposed project is not likely to generate a higher level of solid waste than the existing use of the site; however, implementation of a mandatory Waste Management Plan and compliance with the applicable provisions of the San Diego Municipal Code would ensure that both short- and long-term project-level impacts are not significant. However, the project would contribute, in combination with other development activities in the downtown, to the cumulative increase in the generation of solid waste sent to the Miramar Landfill and the eventual need for a new landfill as identified in the FEIR.</p> <p>The location and size of a new landfill is unknown at this time. Pursuant to Section 15145 of CEQA, analysis of the physical changes that may occur from future construction of landfills would be speculative and no further analysis of their impacts is required. However, construction</p>					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
or expansion of a landfill would be subject to CEQA. Environmental documentation prepared pursuant to CEQA would identify potentially significant impacts and appropriate mitigation measures. Therefore, the proposed project would not result in direct or cumulative impacts associated with this issue.						
14. PARKS AND RECREATIONAL FACILITIES:						
(a) Substantial increase in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? The FEIR discusses impacts to park and recreational facilities and the maintenance thereof and concludes that buildout pursuant to the Downtown Community Plan would not result in significant impacts associated with this issue. The proposed project would not likely generate a level of demand for parks and recreational facilities beyond the level assumed by the FEIR. Therefore, substantial deterioration of existing neighborhood or regional parks would not occur or be substantially accelerated as a result of the proposed project. No direct or cumulative significant impacts associated with this issue would occur.					X	X
15. TRANSPORTATION/TRAFFIC						
(a) Cause the level of service (LOS) on a roadway segment or intersection to drop below LOS E? According to the FEIR, any project anticipated to generate more than 2,400 daily trips or 200 peak hour trips is required to prepare a traffic study. Based on the anticipated use of the proposed project (i.e., fire station), a traffic study was prepared by Linscott, Law, and Greenspan Engineers to assess the potential impacts to the local circulation system as a result of the proposed project. Based on the findings of the study, the proposed fire station would generate a maximum of 138 average daily trips (LLG 2010). The study					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>confirmed that the proposed project would not cause the LOS on any of the study intersections or road segments to drop below the LOS E threshold.</p> <p>While no study intersections would drop below the LOS E threshold, the traffic generated by the proposed fire station could, in combination with the traffic generated by other downtown development and within the project area (i.e., the Monarch School, Tramonto), contribute to the cumulative traffic impacts projected in the FEIR. However, according to the analysis in the project-specific traffic analysis, intersection and road segments operations would still continue to operate at an acceptable LOS in the long term (2030) with implementation of the proposed project. Additionally, it is important to note that all trips from project operation may not necessarily be considered "new" trips. The project site is currently occupied by a drive-through fast food restaurant that is currently generating traffic. Additionally, operation of the proposed fire station would result in a redistribution of existing emergency calls from other stations in the area with the intent of more efficient responses.</p> <p>While the traffic analysis prepared for the proposed project did not determine significant direct or cumulative impacts and no mitigation measures were deemed necessary for project implementation, the following design recommendations related to access, incident call operations, and other modifications were included in the traffic analysis to facilitate adequate operations at driveways and overall access to and from the site:</p> <ul style="list-style-type: none"> • Pacific Highway along the project frontage should comply with the North Embarcadero Visionary Plan (NEVP) cross-section for a 6-lane Prime Arterial. The North Embarcadero Visionary Plan Schematic Design shows a right-of-way of 130 feet and a curb-to-curb 						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>section of 106 feet.</p> <ul style="list-style-type: none"> The project proposes one driveway on Pacific Highway. This driveway is intended to primarily serve the entrance to the personal and fire truck vehicles and the exit to the personal vehicles. The driveway will be restricted to right-in/right-out only movements due to the raised median on Pacific Highway. The driveway is proposed to be placed as far south along the project frontage as physically possible. No issues with this driveway placement are foreseen. Cedar Street along the project frontage should comply with the North Embarcadero Visionary Plan cross-section for a 2-lane Collector. The North Embarcadero Visionary Plan Schematic Design shows a right-of-way of 80 feet and a curb-to-curb width of 52 feet. Based on the "Quiet Zone" conceptual plan for Cedar Street, it shows a raised median of approximately 200 feet in length (with a 30-foot break). In addition, it includes quad gates, pre-signals, cantilevers with flashing lights and pedestrian gates. The traffic signal preemption at the Pacific Highway and Cedar Street intersection should be designed to provide an emergency fire service vehicle the ability to preempt the traffic signal in order to have a green light for Cedar Street. When the tracks are being used by the Trolley, Coaster or Amtrak, gates are down for no more than 30 seconds. For freight trains, the gates can be down for several minutes. When this occurs, queues could develop at the gates and extend all the way to Pacific Highway. Therefore, the southbound left-turn should be skipped so vehicles don't enter Cedar Street without a place to go. If it becomes a problem, then the City will need to monitor and make sure that the fire station driveway blockage is 						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
<p>not a consistent problem. The City should consider a no-right-turn illumination on red and green when gates are down.</p> <ul style="list-style-type: none"> The train call traffic signal preemption takes priority in the event of an incident call. Emergency fire service vehicles traveling east will be forced to withstand the entire train call preemptive system until the train has passed and the gates are raised. The traffic signal preemption at the Pacific Highway and Cedar Street intersection should be designed to provide an emergency fire service vehicle the ability to preempt the traffic signal in order to have a green light for Cedar Street. The preemption system will hold vehicles traveling northbound and southbound on Pacific Highway by giving the vehicles a red light. In the event that the emergency fire vehicle is traveling west during a train call, vehicles waiting for a train to pass that are concurrently blocking the fire station driveway would be able to pull over along the red curb and clear the fire station driveway to create a "break" where the emergency vehicles could exit without major delays. The City should consider a no-right-turn illumination on red and green when gates are down. A painted red curb for 42 feet along the south side of Cedar Street east of the fire station. In the occasion that a vehicle is waiting for a train to pass and is concurrently blocking the fire station driveway, the red curb would allow a vehicle to pull over and clear the fire station driveway. A "Keep Clear" sign should be painted on the pavement in front of the fire station driveway. The raised median due to the "Quiet Zone" will need a break beyond the proposed 30 feet. Increase the median break to 42 feet to allow for fire trucks to make left turns out. <p>As concluded in the traffic analysis prepared for the</p>						

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
proposed project, the proposed project would not result in significant direct or cumulative capacity-related impacts at key intersections or street segments and would not cause the level of service (LOS) on a roadway segment or intersection to drop below LOS E. Therefore, no direct and cumulative impacts are associated with this issue.						
(b) Cause the LOS on a freeway segment to drop below LOS E or cause a ramp delay in excess of 15 minutes? The FEIR concludes that development pursuant to the Downtown Community Plan would result in significant cumulative impacts to freeway segments and ramps serving the downtown planning area. While the project-specific traffic analysis did not analyze impacts to specific freeway segments, it does conclude that implementation of the proposed project would not significantly increase road segment or intersection operations. Nonetheless, the proposed development would contribute on a cumulative-level to the substandard LOS F identified in the FEIR on all freeway segments in the downtown area and on several ramps serving the downtown. FEIR Mitigation Measure TRF-A.2.1-1 would reduce these impacts to the extent feasible, but not below a level of significance, (this mitigation measure is not the responsibility of the proposed project, and therefore, is not included in Attachment A). The FEIR concludes that the uncertainty associated with implementing freeway improvements and limitations in increasing ramp capacity limits the feasibility of fully mitigating impacts to these facilities. Thus, the proposed project's cumulative-level impacts to freeways would remain significant and unavoidable, consistent with the analysis of the FEIR.		X				X
(c) Create an average demand for parking that would exceed the average available supply? Under the 1992 PDO, there is no minimum parking requirement for fire stations. Currently, parking adjacent to the site is prohibited and					X	X

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
would remain so with implementation of the proposed project. However, it is anticipated that the proposed project would provide 16 parking stalls (15 standard and 1 van-accessible) on-site in one underground parking level. Therefore, it is anticipated that the proposed project would not create an average demand for parking that would exceed the average supply and impacts would not be significant. No direct or cumulative significant impacts associated with this issue would occur.						
(d) Substantially discourage the use of alternative modes of transportation or cause transit service capacity to be exceeded? The proposed project does not include any features that would discourage the use of alternative modes of transportation. The proposed project does not include any design features that would cause hazards or barriers for pedestrians or bicyclists. In the event of a fire response, sirens would be used to warn pedestrians and bicyclists that vehicles would be exiting the site. Any required improvements would be constructed to maintain existing conditions as it relates to pedestrians and bicyclists. Therefore, no impact will occur associated with transit or alternative modes of transportation.					X	X
16. MANDATORY FINDINGS OF SIGNIFICANCE						
(a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory? As indicated in the FEIR, due to the highly urbanized nature of the downtown area, no sensitive plant or animal species, habitats, or	X	X				

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
wildlife migration corridors are located in the Centre City area. However, the project does have the potential to eliminate important examples of major periods of California history or prehistory at the project level. No other aspects of the project would substantially degrade the environment. Cumulative impacts are described in subsection 16.b below.						
(b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)? As acknowledged in the FEIR, implementation of the Downtown Community Plan, PDO, and Redevelopment Plan would result in cumulative impacts associated with: aesthetics/visual quality, air quality, historical and archaeological resources, physical changes associated with transient activities, noise, parking, traffic, and water quality. This project would contribute to those impacts, specifically air quality, historical and archaeological resources, noise, traffic, and water quality. Implementation of the mitigation measures identified in the FEIR would reduce some significant cumulative impacts; however, the impacts would remain significant and immitigable. Cumulative impacts would not be greater than those identified in the FEIR		X				
(c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly? As described elsewhere in this study, the proposed project would result in significant and unmitigated impacts. Those impacts associated with air and noise could have substantial adverse effects on human beings. However, these impacts would be no greater than those assumed in the FEIR. Implementation of the mitigation measures	X	X				

Issues and Supporting Information	Significant And Not Mitigated (SNM)		Significant But Mitigated (SM)		Not Significant (NS)	
	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)	Direct (D)	Cumulative (C)
identified in the FEIR would mitigate many, but not all, of the significant impacts.						

REFERENCES

California Climate Action Registry (CCAR)

2009 *California Climate Action Registry General Reporting Protocol: Reporting Entity-Wide Greenhouse Gas Emissions*. Version 3.1. Los Angeles, CA. January.

California Energy Commission (CEC)

2007 *Water-Related Energy Use in California*. Available at <http://www.energy.ca.gov/2007publications/CEC-999-2007-008/CEC-999-2007-008.PDF>. Accessed May 2010.

Leighton and Associates, Inc

2009 *Geotechnical and Fault Investigation, Bayside Fire Station*. April 3.

Linscott Law and Greenspan (LLG)

2010 *Traffic Impact Analysis Bayside Fire Station San Diego, California*. June 17.

Ninyo and Moore (N&M)

2005 *Limited Phase II Environmental Site Assessment*. October 21.

San Diego, City of (City)

2010 Memorandum from Cecilia Gallardo to the Environmental Analysis Section. *Addressing Greenhouse Gas Emissions from Projects subject to CEQA*. March 19.

Rimpo & Associates

2008 URBEMIS 2007 for Windows, Version 9.2.4. Available: <www.urbemis.com>. Last updated 2007. Accessed May 2010.

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ATTACHMENT A
MITIGATION MEASURES
FOR THE PROPOSED
FIRE STATION NO. 2 (BAYSIDE)

JUNE 2010

**ATTACHMENT A
MITIGATION MONITORING AND REPORTING PROGRAM**

SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
AIR QUALITY (AQ)				
<p>Impact AQ-B.1: Dust and construction equipment engine emissions generated during grading and demolition would impact local and regional air quality. (Direct and Cumulative)</p>	<p><i>Mitigation Measure AQ-B.1-1:</i> Prior to approval of a Grading or Demolition Permit, the City shall confirm that the following conditions have been applied, as appropriate:</p> <ol style="list-style-type: none"> 1. Exposed soil areas shall be watered twice per day. On windy days or when fugitive dust can be observed leaving the development site, additional applications of water shall be applied as necessary to prevent visible dust plumes from leaving the development site. When wind velocities are forecast to exceed 25 miles per hour, all ground disturbing activities shall be halted until winds that are forecast to abate below this threshold. 2. Dust suppression techniques shall be implemented including, but not limited to, the following: <ol style="list-style-type: none"> a. Portions of the construction site to remain inactive longer than a period of three months shall be seeded and watered until grass cover is grown or otherwise stabilized in a manner acceptable to the CCDC. b. On-site access points shall be paved as soon as feasible or watered periodically or otherwise stabilized. c. Material transported offsite shall be either sufficiently watered or securely covered to prevent excessive amounts of dust. d. The area disturbed by clearing, grading, earthmoving, or excavation operations shall be minimized at all times. 3. Vehicles on the construction site shall travel at speeds less than 15 miles per hour. 4. Material stockpiles subject to wind erosion during construction activities, which will not be utilized within three days, shall be covered with plastic, an alternative cover deemed equivalent to plastic, or sprayed with a nontoxic chemical stabilizer. 	<p>Prior to Demolition or Grading Permit (Design)</p>	<p>Developer</p>	<p>City</p>

**ATTACHMENT A
MITIGATION MONITORING AND REPORTING PROGRAM**

SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
	<ol style="list-style-type: none"> 5. Where vehicles leave the construction site and enter adjacent public streets, the streets shall be swept daily or washed down at the end of the work day to remove soil tracked onto the paved surface. Any visible track-out extending for more than fifty (50) feet from the access point shall be swept or washed within thirty (30) minutes of deposition. 6. All diesel-powered vehicles and equipment shall be properly operated and maintained. 7. All diesel-powered vehicles and gasoline-powered equipment shall be turned off when not in use for more than five minutes, as required by state law. 8. The construction contractor shall utilize electric or natural gas-powered equipment in lieu of gasoline or diesel-powered engines, where feasible. 9. As much as possible, the construction contractor shall time the construction activities so as not to interfere with peak hour traffic. In order to minimize obstruction of through traffic lanes adjacent to the site, a flag-person shall be retained to maintain safety adjacent to existing roadways, if necessary. 10. The construction contractor shall support and encourage ridesharing and transit incentives for the construction crew. 11. Low VOC coatings shall be used as required by SDAPCD Rule 67. Spray equipment with high transfer efficiency, such as the high volume-low pressure (HPLV) spray method, or manual coatings application such as paint brush hand roller, trowel, spatula, dauber, rag, or sponge, shall be used to reduce VOC emissions, where feasible. 12. If construction equipment powered by alternative fuel sources (LPG/CNG) is available at comparable cost, the developer shall specify that such equipment be used during all construction activities on the development site. 13. The developer shall require the use of particulate filters on diesel construction equipment if use of such filters is demonstrated to be cost-competitive for use on this development. 14. During demolition activities, safety measures as required by 			

**ATTACHMENT A
MITIGATION MONITORING AND REPORTING PROGRAM**

SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
	<p>City/County/State for removal of toxic or hazardous materials shall be utilized.</p> <p>15. Rubble piles shall be maintained in a damp state to minimize dust generation.</p> <p>16. During finish work, low-VOC paints and efficient transfer systems shall be utilized, to the extent possible.</p> <p>17. If alternative-fueled and/or particulate filter-equipped construction equipment is not feasible, construction equipment shall use the newest, least-polluting equipment, whenever possible.</p>			
HISTORICAL RESOURCES (HIST)				
<p>Impact HIST-B.1: Development in downtown could impact significant buried archaeological resources. (Direct and Cumulative)</p>	<p><i>Mitigation Measure HIST-B.1-1:</i> If the potential exists for direct and/or indirect impacts to significant buried archaeological resources, the following measures shall be implemented in coordination with a Development Services Department designee and/or City Staff to the Historic Resources Board (HRB) ("City Staff") in accordance with Chapter 14, Article 3, Division 2, Historical Resources Regulations of the Land Development Code. Prior to issuance of any permit that could directly affect an archaeological resource, City Staff shall assure that all elements of the MMRP are performed in accordance with all applicable City regulations and guidelines by an Archaeologist meeting the qualifications specified in Appendix B of the San Diego Land Development Code, Historical Resources Guidelines. City Staff shall also require that the following steps be taken to determine: (1) the presence of archaeological resources and (2) the appropriate mitigation for any significant resources which may be impacted by a development activity. Sites may include residential and commercial properties, privies, trash pits, building foundations, and industrial features representing the contributions of people from diverse socio-economic and ethnic backgrounds. Sites may also include resources associated with pre-historic Native American activities. Archeological resources which also meet the definition of historical resources or unique archaeological resources under CEQA or the SDMC shall be treated in accordance with the following evaluation procedures and applicable mitigation program:</p> <p>Step 1-Initial Evaluation</p>	<p>Prior to Demolition or Grading Permit (Design)</p> <p>Prior to Certificate of Occupancy (Implementation)</p>	<p>Developer</p>	<p><u>City Staff</u></p>

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	<p>An initial evaluation for the potential of significant subsurface archaeological resources shall be prepared to the satisfaction of City Staff as part of an Environmental Secondary Study for any activity which involves excavation or building demolition. The initial evaluation shall be guided by an appropriate level research design in accordance with the City's Land Development Code, Historical Resources Guidelines. The person completing the initial review shall meet the qualification requirements as set forth in the Historical Resources Guidelines and shall be approved by City Staff. The initial evaluation shall consist, at a minimum, of a review of the following historical sources: The 1876 Bird's Eye View of San Diego, all Sanborn Fire Insurance Company maps, appropriate City directories and maps that identify historical properties or archaeological sites, and a records search at the South Coastal Information Center for archaeological resources located within the property boundaries. Historical and existing land uses shall also be reviewed to assess the potential presence of significant prehistoric and historic archaeological resources. The person completing the initial review shall also consult with and consider input from local individuals and groups with expertise in the historical resources of the San Diego area. These experts may include the University of California, San Diego State University, San Diego Museum of Man, Save Our Heritage Organization (SOHO), local historical and archaeological groups, the Native American Heritage Commission (NAHC), designated community planning groups, and other individuals or groups that may have specific knowledge of the area. Consultation with these or other individuals and groups shall occur as early as possible in the evaluation process.</p> <p>When the initial evaluation indicates that important archaeological sites may be present on a project site but their presence cannot be confirmed prior to construction or demolition due to obstructions or spatially limited testing and data recovery, the applicant shall prepare and implement an archaeological monitoring program as a condition of development approval to the satisfaction of City Staff. If the NAHC Sacred Lands File search is positive for Native American resources within the project site, then additional evaluation must include participation of a local Native American consultant in accordance with CEQA Sections 15064.5(d), 15126.4(b)(3) and Public Resources Code Section 21083.2.</p> <p>No further action is required if the initial evaluation demonstrates there is no</p>			

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	<p>potential for subsurface resources. The results of this research shall be summarized in the Secondary Study.</p> <p>Step 2-Testing</p> <p>A testing program is required if the initial evaluation demonstrates that there is a potential for subsurface resources. The testing program shall be conducted during the hazardous materials remediation or following the removal of any structure or surface covering which may be underlain by potential resources. The removal of these structures shall be conducted in a manner which minimizes disturbance of underlying soil. This shall entail a separate phase of investigations from any mitigation monitoring during construction.</p> <p>The testing program shall be performed by a qualified Historical Archaeologist meeting the qualifications specified in Appendix B of the San Diego Land Development Code, Historical Resources Guidelines. The Historical Archaeologist must be approved by City Staff prior to commencement. Before commencing the testing, a treatment plan shall be submitted for City Staff approval that reviews the initial evaluation results and includes a research design. The research design shall be prepared in accordance with the City's Historical Resources Guidelines and include a discussion of field methods, research questions against which discoveries shall be evaluated for significance, collection strategy, laboratory and analytical approaches, and curation arrangements. All tasks shall be in conformity with best practices in the field of historic urban archaeology. A recommended approach for historic urban sites is at a minimum fills and debris along interior lot lines or other areas indicated on Sanborn maps.</p> <p>Security measures such as a locked fence or surveillance shall be taken to prevent looting or vandalism of archaeological resources as soon as demolition is complete or paved surfaces are removed. These measures shall be maintained during archaeological field investigations. It is recommended that exposed features be covered with steel plates or fill dirt when not being investigated.</p> <p>The results of the testing phase shall be submitted in writing to City Staff and shall include the research design, testing results, significance evaluation, and recommendations for further treatment. Final determination of significance</p>			

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	<p>shall be made in consultation with City Staff, and with the Native American community, if the finds are prehistoric. If no significant resources are found and site conditions are such that there is no potential for further discoveries, then no further action is required. If no significant resources are found but results of the initial evaluation and testing phase indicates there is still a potential for resources to be present in portions of the property that could not be tested, then mitigation monitoring is required and shall be conducted in accordance with the provisions set forth in Step 4 - Monitoring. If significant resources are discovered during the testing program, then data recovery in accordance with Step 3 shall be undertaken prior to construction. If the existence or probable likelihood of Native American human remains or associated grave goods area discovered through the testing program, the Qualified Archaeologist shall stop work in the area, notify the City Building Inspector, City staff, and immediately implement the procedures set forth in CEQA Guidelines Section 15064.5 and the California Public Resources Code (PRC) Section 5097.98 for discovery of human remains. This procedure is further detailed in the Mitigation, Monitoring and Reporting Program (Step 4). City Staff must concur with evaluation results before the next steps can proceed.</p> <p>Step 3-Data Recovery</p> <p>For any site determined to be significant, a Research Design and Data Recovery Program (RDDR) shall be prepared in accordance with the City's Historical Resources Guidelines, approved by City Staff, and carried out to mitigate impacts before any activity is conducted which could potentially disturb significant resources. The archaeologist shall notify City Staff of the date upon which data recovery will commence ten (10) working days in advance.</p> <p>All cultural materials collected shall be cleaned, catalogued and permanently curated with an appropriate institution. Native American burial resources shall be treated in the manner agreed to by the Native American representative or be reinterred on the site in an area not subject to further disturbance in accordance with CEQA section 15164.5 and the Public Resources Code section 5097.98. All artifacts shall be analyzed to identify function and chronology as they relate to the history of the area. Faunal material shall be identified as to species and specialty studies shall be completed, as appropriate. All newly discovered archaeological sites shall be recorded with the South Coastal Information</p>			

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	<p>Center at San Diego State University. Any human bones and associated grave goods of Native American origin encountered during Step 2-Testing, shall, upon consultation, be turned over to the appropriate Native American representative(s) for treatment in accordance with state regulations as further outlined under Step 4-Monitoring (Section IV. Discovery of Human Remains).</p> <p>A draft Data Recovery Report shall be submitted to City Staff within twelve months of the commencement of the data recovery. Data Recovery Reports shall describe the research design or questions, historic context of the finds, field results, analysis of artifacts, and conclusions. Appropriate figures, maps and tables shall accompany the text. The report shall also include a catalogue of all finds and a description of curation arrangements at an approved facility, and a general statement indicating the disposition of any human remains encountered during the data recovery effort (please note that the location of reinternment and/or repatriation is confidential and not subject to public disclosure in accordance with state law). Finalization of draft reports shall be subject to City Staff review.</p> <p>Step 4 – Monitoring</p> <p>If no significant resources are encountered, but results of the initial evaluation and testing phase indicates there is still a potential for resources to be present in portions of the property that could not be tested, then mitigation monitoring is required and shall be conducted in accordance with the following provisions and components:</p> <p>I. Prior to Permit Issuance</p> <p>A. Construction Plan Check</p> <p>1. Prior to Notice to Proceed (NTP) for any construction permits, including but not limited to, the first Grading Permit, Demolition Permits and Building Permits, but prior to the first Precon Meeting, whichever is applicable, City Staff shall verify that the requirements for Archaeological Monitoring and Native American monitoring, where the project may impact Native American resources, have been noted on the appropriate construction documents.</p> <p>B. Letters of Qualification have been submitted to City Staff</p>			

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	<ol style="list-style-type: none"> 1. The applicant shall submit a letter of verification to City Staff identifying the Principal Investigator (PI) for the project and the names of all persons involved in the archaeological monitoring program, as defined in the City of San Diego Historical Resources Guidelines (HRG). If applicable, individuals involved in the archaeological monitoring program must have completed the 40-hour HAZWOPER training with certification documentation. 2. City Staff will provide a letter to the applicant confirming that the qualifications of the PI and all persons involved in the archaeological monitoring of the project meet the qualifications established in the HRG. 3. Prior to the start of work, the applicant must obtain written approval from City Staff for any personnel changes associated with the monitoring program. <p>II. Prior to Start of Construction</p> <p>A. Verification of Records Search</p> <ol style="list-style-type: none"> 1. The PI shall provide verification to City Staff that a site-specific records search (1/4 mile radius) has been completed. Verification includes, but is not limited to a copy of a confirmation letter from South Coastal Information Center, or, if the search was in-house, a letter of verification from the PI stating that the search was completed. 2. The letter shall introduce any pertinent information concerning expectations and probabilities of discovery during trenching and/or grading activities. 3. The PI may submit a detailed letter to City Staff requesting a reduction to the 1/4 mile radius. <p>B. PI Shall Attend Precon Meetings</p> <ol style="list-style-type: none"> 1. Prior to beginning any work that requires monitoring, the Applicant shall arrange a Precon Meeting that shall include the PI, Native American consultant/monitor (where Native American resources may be impacted), Construction Manager (CM) and/or Grading Contractor, Resident Engineer (RE), the Native American representative(s) (where Native American resources may be impacted), Building Inspector (BI), if appropriate, and 			

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	<p>City Staff. The qualified Archaeologist and the Native American consultant/monitor shall attend any grading/excavation related Precon Meetings to make comments and/or suggestions concerning the Archaeological Monitoring program with the Construction Manager and/or Grading Contractor.</p> <p>(a) If the PI is unable to attend the Precon Meeting, the Applicant shall schedule a focused Precon Meeting with City Staff, the PI, RE, CM or BI, if appropriate, prior to the start of any work that requires monitoring.</p> <p>2. Archaeological Monitoring Plan (AMP)</p> <p>(a) Prior to the start of any work that requires monitoring, the PI shall submit an Archaeological Monitoring Plan (with verification that the AMP has been reviewed and approved by the Native American consultant/monitor when NA resources may be impacted) which describes how the monitoring would be accomplished for approval by City Staff and the Native American monitor. The AMP shall include an Archaeological Monitoring Exhibit (AME) based on the appropriate construction documents (reduced to 11x17) to City Staff identifying the areas to be monitored including the delineation of grading/excavation limits.</p> <p>(b) The AME shall be based on the results of a site-specific records search as well as information regarding existing known soil conditions (native or formation).</p> <p>(c) Prior to the start of any work, the PI shall also submit a construction schedule to City Staff through the RE indicating when and where monitoring will occur.</p> <p>(d) The PI may submit a detailed letter to City Staff prior to the start of work or during construction requesting a modification to the monitoring program. This request shall be based on relevant information such as review of final construction documents which indicate site conditions such as depth of excavation and/or site graded to bedrock, etc., which may reduce or increase the potential for resources to be present.</p> <p>III. During Construction</p>			

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	<p>A. Monitor(s) Shall be Present During Grading/Excavation/Trenching</p> <ol style="list-style-type: none"> 1. The Archaeological monitor shall be present full-time during all soil disturbing and grading/excavation /trenching activities which could result in impacts to archaeological resources as identified on the AME. The Construction Manager is responsible for notifying the RE, PI, and City Staff of changes to any construction activities. 2. The Native American consultant/monitor shall determine the extent of their presence during soil disturbing and grading/excavation/trenching activities based on the AME, and provide that information to the PI and City Staff. If prehistoric resources are encountered during the Native American consultant/monitor's absence, work shall stop and the Discovery Notification Processes detailed in Sections IILB-C, and IVA-D, shall commence. 3. The archeological and Native American consultant/monitor shall document field activity via the Consultant Site Visit Record (CSVR). The CSVr's shall be faxed by the CM to the RE the first day of monitoring, the last day of monitoring, monthly (Notification of Monitoring Completion), and in the case of ANY discoveries. The RE shall forward copies to City Staff. 4. The PI may submit a detailed letter to City Staff during construction requesting a modification to the monitoring program when a field condition such as modern disturbance post-dating the previous grading/trenching activities, presence of fossil formations, or when native soils are encountered that may reduce or increase the potential for resources to be present. <p>B. Discovery Notification Process</p> <ol style="list-style-type: none"> 1. In the event of a discovery, the Archaeological Monitor shall direct the contractor to temporarily divert all soil disturbing activities, including but not limited to, digging, trenching, excavating, or grading activities in the area of discovery and in the area reasonably suspected to overlay adjacent resources and immediately notify the RE or BI, as appropriate. 2. The Monitor shall immediately notify the PI (unless Monitor is 			

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	<p>the PI) of the discovery.</p> <p>3. The PI shall immediately notify City Staff by phone of the discovery, and shall also submit written documentation to City Staff within 24 hours by fax or email with photos of the resource in context, if possible.</p> <p>4. No soil shall be exported off-site until a determination can be made regarding the significance of the resource specifically if Native American resources are encountered.</p> <p>C. Determination of Significance</p> <p>1. The PI and Native American consultant/monitor, where Native American resources are discovered, shall evaluate the significance of the resource. If Human Remains are involved, follow protocol in Section IV below.</p> <p>(a) The PI shall immediately notify City Staff by phone to discuss significance determination and shall also submit a letter to City Staff indicating whether additional mitigation is required.</p> <p>(b) If the resource is significant, the PI shall submit an Archaeological Data Recovery Program (ADRP) which has been reviewed by the Native American consultant/monitor when applicable, and obtain written approval from City Staff and the Native American representative(s), if applicable. Impacts to significant resources must be mitigated before ground disturbing activities in the area of discovery will be allowed to resume.</p> <p>(c) If the resource is not significant, the PI shall submit a letter to City Staff indicating that artifacts will be collected, curated, and documented in the Final Monitoring Report. The letter shall also indicate that that no further work is required.</p> <p>IV. Discovery of Human Remains</p> <p>If human remains are discovered, work shall halt in that area and no soil shall be exported off-site until a determination can be made regarding the provenance of the human remains; and the following procedures set forth in CEQA Section 15064.5(e), the California</p>			

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	<p>Public Resources Code (Sec. 5097.98) and State Health and Safety Code (Sec. 7050.5) shall be undertaken:</p> <p>A. Notification</p> <ol style="list-style-type: none"> 1. Archaeological Monitor shall notify the RE or BI as appropriate, City Staff, and the PI, if the Monitor is not qualified as a PI. City Staff will notify the appropriate Senior Planner in the Environmental Analysis Section (EAS) of the Development Services Department to assist with the discovery process. 2. The PI shall notify the Medical Examiner after consultation with the RE, either in person or via telephone. <p>B. Isolate discovery site</p> <ol style="list-style-type: none"> 1. Work shall be directed away from the location of the discovery and any nearby area reasonably suspected to overlay adjacent human remains until a determination can be made by the Medical Examiner in consultation with the PI concerning the provenance of the remains. 2. The Medical Examiner, in consultation with the PI, will determine the need for a field examination to determine the provenance. 3. If a field examination is not warranted, the Medical Examiner will determine with input from the PI, if the remains are or are most likely to be of Native American origin. <p>C. If Human Remains are determined to be Native American</p> <ol style="list-style-type: none"> 1. The Medical Examiner will notify the Native American Heritage Commission (NAHC) within 24 hours. By law, ONLY the Medical Examiner can make this call. 2. NAHC will immediately identify the person or persons determined to be the Most Likely Descendent (MLD) and provide contact information.. 3. The MLD will contact the PI within 24 hours or sooner after the Medical Examiner has completed coordination, to begin the consultation process in accordance with CEQA Section 15064.5(e) and the California Public Resources and Health & Safety Codes. 4. The MLD will have 48 hours to make recommendations to the property owner or representative, for the treatment or disposition 			

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	<p>with proper dignity, of the human remains and associated grave goods.</p> <p>5. Disposition of Native American Human Remains will be determined between the MLD and the PI, and if:</p> <p>(a) The NAHC is unable to identify the MLD, OR the MLD failed to make a recommendation within 48 hours after being notified by the Commission; OR;</p> <p>(b) The landowner or authorized representative rejects the recommendation of the MLD and mediation in accordance with PRC 5097.94 (k) by the NAHC fails to provide measures acceptable to the landowner, THEN,</p> <p>(c) In order to protect these sites, the Landowner shall do one or more of the following:</p> <p>(1) Record the site with the NAHC;</p> <p>(2) Record an open space or conservation easement on the site;</p> <p>(3) Record a document with the County.</p> <p>6. Upon the discovery of multiple Native American human remains during a ground disturbing land development activity, the landowner may agree that additional conferral with descendants is necessary to consider culturally appropriate treatment of multiple Native American human remains. Culturally appropriate treatment of such a discovery may be ascertained from review of the site utilizing cultural and archaeological standards. Where the parties are unable to agree on the appropriate treatment measures the human remains and buried with Native American human remains shall be reinterred with appropriate dignity, pursuant to Section 5.c., above.</p> <p>D. If Human Remains are not Native American</p> <p>1. The PI shall contact the Medical Examiner and notify them of the historic era context of the burial.</p> <p>2. The Medical Examiner will determine the appropriate course of action with the PI and City staff (PRC 5097.98).</p> <p>3. If the remains are of historic origin, they shall be appropriately removed and conveyed to the San Diego Museum of Man for analysis. The decision for interment of the human remains shall be made in consultation with City Staff, the applicant/landowner</p>			

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	<p align="center">and the San Diego Museum of Man.</p> <p>V. Night and/or Weekend Work</p> <p>A. If night and/or work is included in the contract</p> <ol style="list-style-type: none"> 1. When night and/or weekend work is included in the contract package, the extent and timing shall be presented and discussed at the Precon Meeting. 2. The following procedures shall be followed. <ol style="list-style-type: none"> (a) No Discoveries In the event that no discoveries were encountered during night and/or weekend work, the PI shall record the information on the CSVr and submit to City Staff via fax by 8 am of the next business day. (b) Discoveries All discoveries shall be processed and documented using the existing procedures detailed in Sections III - During Construction, and IV - Discovery of Human Remains. Discovery of human remains shall always be treated as a significant discovery. (c) Potentially Significant Discoveries If the PI determines that a potentially significant discovery has been made, the procedures detailed under Section III - During Construction and IV-Discovery of Human Remains shall be followed. (d) The PI shall immediately contact City Staff, or by 8 am of the next business day to report and discuss the findings as indicated in Section III-B, unless other specific arrangements have been made. <p>B. If night and/or weekend work becomes necessary during the course of construction</p> <ol style="list-style-type: none"> 1. The Construction Manager shall notify the RE, or BI, as appropriate, a minimum of 24 hours before the work is to begin. 2. The RE, or BI, as appropriate, shall notify City Staff immediately. <p>C. All other procedures described above shall apply, as appropriate.</p> <p>VI. Post Construction</p>			

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	<p>A. Submittal of Draft Monitoring Report</p> <ol style="list-style-type: none"> 1. The PI shall submit two copies of the Draft Monitoring Report (even if negative) prepared in accordance with the Historical Resources Guidelines and Appendices which describes the results, analysis, and conclusions of all phases of the Archaeological Monitoring Program (with appropriate graphics) to City Staff, for review and approval within 90 days following the completion of monitoring. <ol style="list-style-type: none"> (a) For significant archaeological resources encountered during monitoring, the Archaeological Data Recovery Program shall be included in the Draft Monitoring Report. (b) Recording sites with State of California Department of Parks and Recreation The PI shall be responsible for recording (on the appropriate State of California Department of Park and Recreation forms-DPR 523 A/B) any significant or potentially significant resources encountered during the Archaeological Monitoring Program in accordance with the City's Historical Resources Guidelines, and submittal of such forms to the South Coastal Information Center with the Final Monitoring Report. 2. City Staff shall return the Draft Monitoring Report to the PI for revision or, for preparation of the Final Report. 3. The PI shall submit revised Draft Monitoring Report to City Staff for approval. 4. City Staff shall provide written verification to the PI of the approved report. 5. City Staff shall notify the RE or BI, as appropriate, of receipt of all Draft Monitoring Report submittals and approvals. <p>B. Handling of Artifacts and Submittal of Collections Management Plan, if applicable</p> <ol style="list-style-type: none"> 1. The PI shall be responsible for ensuring that all cultural remains collected are cleaned and catalogued. 2. The PI shall be responsible for ensuring that all artifacts are analyzed to identify function and chronology as they relate to the 			

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	<p>history of the area; that faunal material is identified as to species; and that specialty studies are completed, as appropriate.</p> <p>3. The PI shall submit a Collections Management Plan to City Staff for review and approval for any project which results in a substantial collection of historical artifacts.</p> <p>C. Curation of artifacts: Accession Agreement and Acceptance Verification</p> <p>1. The PI shall be responsible for ensuring that all artifacts associated with the survey, testing and/or data recovery for this project are permanently curated with an appropriate institution. This shall be completed in consultation with City Staff and the Native American representative, as applicable.</p> <p>2. The PI shall include the Acceptance Verification from the curation institution in the Final Monitoring Report submitted to the RE or BI and City Staff.</p> <p>3. When applicable to the situation, the PI shall include written verification from the Native American consultant/monitor indicating that Native American resources were treated in accordance with state law and/or applicable agreements. If the resources were reinterred, verification shall be provided to show what protective measures were taken to ensure no further disturbance in accordance with section IV – Discovery of Human Remains, subsection 5.(d).</p> <p>D. Final Monitoring Report(s)</p> <p>1. The PI shall submit one copy of the approved Final Monitoring Report to the RE or BI as appropriate, and one copy to City Staff (even if negative), within 90 days after notification from City Staff that the draft report has been approved.</p> <p>2. The RE shall, in no case, issue the Notice of Completion until receiving a copy of the approved Final Monitoring Report from City Staff which includes the Acceptance Verification from the curation institution.</p>			

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NOISE (NOI)				
Impact NOI-B.1: Noise generated by I-5 and highly traveled grid streets could cause interior noise levels in noise-sensitive uses (exclusive of residential and hotel uses) to exceed 45 dB(A). (Direct)	<i>Mitigation Measure NOI-B.1-1:</i> Prior to approval of a Building Permit for any residential, hospital, or hotel within 475 feet of the centerline of Interstate 5 or adjacent to a roadway carrying more than 7,000 ADT, an acoustical analysis shall be performed to confirm that architectural or other design features are included which would assure that noise levels within habitable rooms would not exceed 45 dB(A) CNEL.	Prior to Building Permit (Design) Prior to Certificate of Occupancy (Implementation)	Developer	CCDC/City
PALEONTOLOGICAL RESOURCES (PAL)				
Impact PAL-A.1: Excavation in geologic formations with a moderate to high potential for paleontological resources could have an significant impact on these resources, if present. (Direct)	<i>Mitigation Measure PAL-A.1-1:</i> In the event the Secondary Study indicates the potential for significant paleontological resources, the following measures shall be implemented as determined appropriate by CCDC. I. Prior to Permit Issuance A. Construction Plan Check 1. Prior to Notice to Proceed (NTP) for any construction permits, including but not limited to, the first Grading Permit, Demolition Permits and Building Permits, but prior to the first preconstruction meeting, whichever is applicable, Centre City Development Corporation (CCDC) shall verify that the requirements for Paleontological Monitoring have been noted on the appropriate construction documents. B. Letters of Qualification have been submitted to CCDC 1. The applicant shall submit a letter of verification to CCDC identifying the Principal Investigator (PI) for the project and the names of all persons involved in the paleontological monitoring program, as defined in the City of San Diego Paleontology Guidelines. 2. CCDC will provide a letter to the applicant confirming the qualifications of the PI and all persons involved in the paleontological monitoring of the project. 3. Prior to the start of work, the applicant shall obtain approval from CCDC for any personnel changes associated with the monitoring			

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	<p align="center">program.</p> <p>II. Prior to Start of Construction</p> <p>A. Verification of Records Search</p> <ol style="list-style-type: none"> 1. The PI shall provide verification to CCDC that a site-specific records search has been completed. Verification includes, but is not limited to a copy of a confirmation letter from San Diego Natural History Museum, other institution or, if the search was in-house, a letter of verification from the PI stating that the search was completed. 2. The letter shall introduce any pertinent information concerning expectations and probabilities of discovery during trenching and/or grading activities. <p>B. PI Shall Attend Precon Meetings</p> <ol style="list-style-type: none"> 1. Prior to beginning any work that requires monitoring, the Applicant shall arrange a Precon Meeting that shall include the PI, Construction Manager (CM) and/or Grading Contractor, Resident Engineer (RE), Building Inspector (BI), if appropriate, and CCDC. The qualified paleontologist shall attend any grading/excavation related Precon Meetings to make comments and/or suggestions concerning the Paleontological Monitoring program with the Construction Manager and/or Grading Contractor. <ol style="list-style-type: none"> a. If the PI is unable to attend the Precon Meeting, the Applicant shall schedule a focused Precon Meeting with CCDC, the PI, RE, CM or BI, if appropriate, prior to the start of any work that requires monitoring. 2. Identify Areas to be Monitored <ol style="list-style-type: none"> a. Prior to the start of any work that requires monitoring, the PI shall submit a Paleontological Monitoring Exhibit (PME) based on the appropriate construction documents (reduced to 11x17) to CCDC identifying the areas to be monitored including the delineation of grading/excavation limits. The PME shall be based on the results of a site specific records search as well as information regarding existing known soil conditions (native or formation). 			

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SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
	<p>3. When Monitoring Will Occur</p> <p>a. Prior to the start of any work, the PI shall also submit a construction schedule to CCDC through the RE indicating when and where monitoring will occur.</p> <p>b. The PI may submit a detailed letter to CCDC prior to the start of work or during construction requesting a modification to the monitoring program. This request shall be based on relevant information such as review of final construction documents which indicate conditions such as depth of excavation and/or site graded to bedrock, presence or absence of fossil resources, etc., which may reduce or increase the potential for resources to be present.</p> <p>III. During Construction</p> <p>A. Monitor Shall be Present During Grading/Excavation/Trenching</p> <p>1. The monitor shall be present full-time during grading/excavation/trenching activities as identified on the PME that could result in impacts to formations with high and moderate resource sensitivity. The Construction Manager is responsible for notifying the RE, PI, and CCDC of changes to any construction activities.</p> <p>2. The monitor shall document field activity via the Consultant Site Visit Record (CSVR). The CSVR's shall be faxed by the CM to the RE the first day of monitoring, the last day of monitoring, monthly (Notification of Monitoring Completion), and in the case of any discoveries. The RE shall forward copies to CCDC.</p> <p>3. The PI may submit a detailed letter to CCDC during construction requesting a modification to the monitoring program when a field condition such as trenching activities that do not encounter formational soils as previously assumed, and/or when unique/unusual fossils are encountered, which may reduce or increase the potential for resources to be present.</p> <p>B. Discovery Notification Process</p> <p>1. In the event of a discovery, the Paleontological Monitor shall direct the contractor to temporarily divert trenching activities in the area of discovery and immediately notify the RE or BI, as appropriate.</p>			

**ATTACHMENT A
MITIGATION MONITORING AND REPORTING PROGRAM**

SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
	<p>2. The Monitor shall immediately notify the PI (unless Monitor is the PI) of the discovery.</p> <p>3. The PI shall immediately notify CCDC by phone of the discovery, and shall also submit written documentation to CCDC within 24 hours by fax or email with photos of the resource in context, if possible.</p> <p>C. Determination of Significance</p> <p>1. The PI shall evaluate the significance of the resource.</p> <p>a. The PI shall immediately notify CCDC by phone to discuss significance determination and shall also submit a letter to CCDC indicating whether additional mitigation is required. The determination of significance for fossil discoveries shall be at the discretion of the PI.</p> <p>b. If the resource is significant, the PI shall submit a Paleontological Recovery Program (PRP) and obtain written approval from CCDC. Impacts to significant resources must be mitigated before ground disturbing activities in the area of discovery will be allowed to resume.</p> <p>c. If resource is not significant (e.g., small pieces of broken common shell fragments or other scattered common fossils) the PI shall notify the RE, or BI as appropriate, that a non-significant discovery has been made. The Paleontologist shall continue to monitor the area without notification to CCDC unless a significant resource is encountered.</p> <p>d. The PI shall submit a letter to CCDC indicating that fossil resources will be collected, curated, and documented in the Final Monitoring Report. The letter shall also indicate that no further work is required.</p> <p>IV. Night Work</p> <p>A. If night work is included in the contract</p> <p>1. When night work is included in the contract package, the extent and timing shall be presented and discussed at the precon meeting.</p> <p>2. The following procedures shall be followed.</p> <p>a. No Discoveries</p> <p>(1) In the event that no discoveries were encountered</p>			

**ATTACHMENT A
MITIGATION MONITORING AND REPORTING PROGRAM**

SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
	<p>during night work, The PI shall record the information on the CSVr and submit to CCDC via fax by 9am the following morning, if possible.</p> <ul style="list-style-type: none"> b. Discoveries <ul style="list-style-type: none"> (1) All discoveries shall be processed and documented using the existing procedures detailed in Sections III - During Construction. c. Potentially Significant Discoveries <ul style="list-style-type: none"> (1) If the PI determines that a potentially significant discovery has been made, the procedures detailed under Section III - During Construction shall be followed. d. The PI shall immediately contact CCDC, or by 8AM the following morning to report and discuss the findings as indicated in Section III-B, unless other specific arrangements have been made. <p>B. If night work becomes necessary during the course of construction</p> <ul style="list-style-type: none"> 1. The Construction Manager shall notify the RE, or BI, as appropriate, a minimum of 24 hours before the work is to begin. 2. The RE, or BI, as appropriate, shall notify CCDC immediately. <p>C. All other procedures described above shall apply, as appropriate.</p> <p>VI. Post Construction</p> <p>A. Submittal of Draft Monitoring Report</p> <ul style="list-style-type: none"> 1. The PI shall submit two copies of the Draft Monitoring Report (even if negative) which describes the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program (with appropriate graphics) to CCDC for review and approval within 90 days following the completion of monitoring, <ul style="list-style-type: none"> a. For significant paleontological resources encountered during monitoring, the Paleontological Recovery Program shall be included in the Draft Monitoring Report. b. Recording Sites with the San Diego Natural History Museum <ul style="list-style-type: none"> (1) The PI shall be responsible for recording (on the appropriate forms) any significant or potentially significant fossil resources encountered during the 			

**ATTACHMENT A
MITIGATION MONITORING AND REPORTING PROGRAM**

SIGNIFICANT IMPACT(S)	MITIGATION MEASURE(S)	IMPLEMENTATION TIME FRAME	IMPLEMENTATION RESPONSIBILITY	VERIFICATION RESPONSIBILITY
	<p>Paleontological Monitoring Program in accordance with the City's Paleontological Guidelines, and submittal of such forms to the San Diego Natural History Museum with the Final Monitoring Report.</p> <ol style="list-style-type: none"> 2. CCDC shall return the Draft Monitoring Report to the PI for revision or, for preparation of the Final Report. 3. The PI shall submit revised Draft Monitoring Report to CCDC for approval. 4. CCDC shall provide written verification to the PI of the approved report. 5. CCDC shall notify the RE or BI, as appropriate, of receipt of all Draft Monitoring Report submittals and approvals. <p>B. Handling of Fossil Remains</p> <ol style="list-style-type: none"> 1. The PI shall be responsible for ensuring that all fossil remains collected are cleaned and catalogued. 2. The PI shall be responsible for ensuring that all fossil remains are analyzed to identify function and chronology as they relate to the geologic history of the area; that faunal material is identified as to species; and that specialty studies are completed, as appropriate <p>C. Curation of fossil remains: Deed of Gift and Acceptance Verification</p> <ol style="list-style-type: none"> 1. The PI shall be responsible for ensuring that all fossil remains associated with the monitoring for this project are permanently curated with an appropriate institution. 2. The PI shall include the Acceptance Verification from the curation institution in the Final Monitoring Report submitted to the RE or BI and CCDC. <p>D. Final Monitoring Report(s)</p> <ol style="list-style-type: none"> 1. The PI shall submit two copies of the Final Monitoring Report to CCDC (even if negative), within 90 days after notification from CCDC that the draft report has been approved. 2. The RE shall, in no case, issue the Notice of Completion until receiving a copy of the approved Final Monitoring Report from CCDC which includes the Acceptance Verification from the curation institution. 			

ATTACHMENT B
GREENHOUSE GAS MODELING ASSUMPTIONS
JUNE 2010

Appendix Bayside Fire Station GHG Calculations

Mobile-Source Emissions (Source: URBEMIS)

Operational Year 2013 240.67 tons 0.907 MT/ton 218 MT/yr

Emissions from Energy Consumption ¹

Electricity

Total KWh	MWh	Region	Emission Factor (lb CO2/MWh)	GWP	Emission Factor (lb CH4/MWh)	GWP	Emission Factor (lb N2O/MWh)	GWP	Total CO2e (Metric Tons/year)
130,000	130	CALI	739.05	1	0.0302	23	0.0081	296	44

Natural Gas

Total Therms	MMBTU	Region	Emission Factor (kg CO2/MMBTU)	GWP	Emission Factor (kg CH4/MMBTU)	GWP	Emission Factor (kg N2O/MMBTU)	GWP	Total CO2e (Metric Tons/year)
1,701	170	California	53.06	1	0.005	23	0.0001	296	9

Indirect Emissions from Municipal Water Use (Includes conveyance, treatment, distribution, and wastewater treatment) ²

KWh/million gallons/year*	KWh/acre-ft/year	Gallons/Year	Total KWh	MWh	Region	Emission Factor (lb CO2/MWh)	GWP	Emission Factor (lb CH4/MWh)	GWP	Emission Factor (lb N2O/MWh)	GWP	Total CO2e (Metric Tons/year)
12,700	4138	411,400	5,225	5	CALI	739.05	1	0.0302	23	0.0081	296	2

*for Southern California

Emissions from Waste Generation	Total CO2e (Metric Tons/year)	1
---------------------------------	-------------------------------	---

Total Direct & Indirect Emissions (MT CO2e/yr)	274
---	------------

Sources:

1 California Climate Action Registry [CCAR] General Reporting Protocol v 3.1 January 2009

2 California Energy Commission [CEC] 2006. California Energy - Water Relationship Staff Report CEC-700-2005-011-SF. Available: <http://www.energy.ca.gov/2007publications/CEC-999-2007-008/CEC-999-2007-008.PDF>

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Work\Projects\CCDC Bayside Fire Station\Bayside FS.urb924

Project Name: Bayside Firestation

Project Location: Riverside County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	0.18	0.27	1.98	0.00	0.41	0.08	240.67

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	0.18	0.27	1.98	0.00	0.41	0.08	240.67

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM25</u>	<u>CO2</u>
Government office building	0.18	0.27	1.98	0.00	0.41	0.08	240.67
TOTALS (tons/year, unmitigated)	0.18	0.27	1.98	0.00	0.41	0.08	240.67

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2013 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Government office building		8.63	1000 sq ft	16.00	138.08	1,279.31
					138.08	1,279.31

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	45.4	0.4	99.4	0.2
Light Truck < 3750 lbs	9.5	1.1	94.7	4.2
Light Truck 3751-5750 lbs	22.0	0.5	99.5	0.0
Med Truck 5751-8500 lbs	12.2	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.9	0.0	78.9	21.1
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	0.8	0.0	12.5	87.5
Heavy-Heavy Truck 33,001-60,000 lbs	1.5	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	4.5	53.3	46.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	1.4	0.0	85.7	14.3

	<u>Travel Conditions</u>					
	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commuter	Non-Work	Customer
Urban Trip Length (miles)	12.7	7.0	9.5	13.3	7.4	8.9
Rural Trip Length (miles)	17.6	12.1	14.9	15.4	9.6	12.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Government office building				10.0	5.0	85.0

GHG Emissions from Waste Generation

Landfilled Waste

4 tons/yr

Residential Waste Characterization*

	Landfilled tons	MTCO2e
Mixed Garbage	6.2%	0 0.08
PCs	1.2%	0 0.00
Glass	2.0%	0 0.00
Cardboard	-	-
Ferrous (Iron/steel)	8.8%	0 0.01
Aluminum	-	-
Plastic	12.0%	0 0.02
Organics (food waste)	29.2%	1 0.69
Yard waste/wood	-	-
Mixed Paper	26.5%	1 0.35
Concrete	-	-
C&D (Construction/Demolition waste)	14.1%	0 (0.05)
Total	100.0%	4 1.11

*commercial waste characterization assumed to be similar.

(Version 9.01, 3/09)

http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html#click

The emission factors presented in this table reflect national average landfill gas recovery practices and transportation distances.

Greenhouse Gas Emission Factors (MTCO2E per short ton)

Material	Source Reduction	Recycling	Landfilling, National Average	Landfilling, No Recovery	Landfilling, Flaring	Landfilling, Energy Recovery	Combustion	Composting
Aluminum Cans	-8.29	-13.67	0.04	0.04	0.04	0.04	0.06	N/A
Steel Cans	-3.19	-1.8	0.04	0.04	0.04	0.04	-1.54	N/A
Copper Wire	-7.41	-4.97	0.04	0.04	0.04	0.04	0.06	N/A
Glass	-0.58	-0.28	0.04	0.04	0.04	0.04	0.05	N/A
HDPE	-1.8	-1.4	0.04	0.04	0.04	0.04	0.91	N/A
LDPE	-2.29	-1.71	0.04	0.04	0.04	0.04	0.91	N/A
PET	-2.11	-1.55	0.04	0.04	0.04	0.04	1.07	N/A
Corrugated Box	-5.59	-3.11	0.33	1.49	-0.22	-0.46	-0.66	N/A
Magazines	-8.66	-3.07	-0.33	0.14	-0.55	-0.65	-0.48	N/A
Newspaper	-4.89	-2.8	-0.89	-0.48	-1.09	-1.18	-0.75	N/A
Office Paper	-8.01	-2.85	1.76	3.71	0.84	0.42	-0.63	N/A
Phonebook	-6.34	-2.66	-0.89	-0.48	-1.09	-1.18	-0.75	N/A
Textbook	-9.18	-3.11	1.76	3.71	0.84	0.42	-0.63	N/A
Dimensional Lumber	-2.02	-2.46	-0.52	0.07	-0.81	-0.93	-0.79	N/A
Fiberboard	-2.22	-2.47	-0.52	0.07	-0.81	-0.93	-0.79	N/A
Food Waste	N/A	N/A	0.68	1.43	0.33	0.16	-0.18	-0.2
Yard Waste	N/A	N/A	-0.34	0.06	-0.54	-0.62	-0.22	-0.2
Grass	N/A	N/A	0.15	0.51	-0.02	-0.1	-0.22	-0.2
Leaves	N/A	N/A	-0.58	-0.3	-0.72	-0.78	-0.22	-0.2
Branches	N/A	N/A	-0.52	0.07	-0.81	-0.93	-0.22	-0.2
Mixed Paper Board	N/A	-3.54	0.27	1.35	-0.24	-0.47	-0.66	N/A
Mixed Paper - Residential	N/A	-3.54	0.19	1.21	-0.3	-0.52	-0.66	N/A
Mixed Paper - Office	N/A	-3.42	0.38	1.43	-0.12	-0.34	-0.6	N/A
Mixed Metals	N/A	-5.26	0.04	0.04	0.04	0.04	-1.07	N/A
Mixed Plastics	N/A	-1.52	0.04	0.04	0.04	0.04	0.97	N/A
Mixed Recyclables	N/A	-2.88	0.08	0.93	-0.3	-0.47	-0.6	N/A
Mixed Organics	N/A	N/A	0.15	0.59	-0.24	-0.37	-0.2	-0.2
MixedMSW	N/A	N/A	0.37	1.34	-0.1	-0.31	-0.13	N/A
Carpets	-4.03	-7.23	0.04	0.04	0.04	0.04	0.37	N/A
PCs	-55.97	-2.27	0.04	0.04	0.04	0.04	-0.2	N/A
ClayBricks	-0.29	N/A	0.04	0.04	0.04	0.04	N/A	N/A
Aggregate	N/A	-0.01	0.04	0.04	0.04	0.04	N/A	N/A
FlyAsh	N/A	-0.87	0.04	0.04	0.04	0.04	N/A	N/A
Tires	-4.01	-1.84	0.04	0.04	0.04	0.04	0.09	N/A

APPENDIX G
GEOTECHNICAL REPORT

GEOTECHNICAL AND FAULT INVESTIGATION,
BAYSIDE FIRE STATION
SAN DIEGO, CALIFORNIA

Prepared for:

Centre City Development Corporation

401 B Street, Suite 400
San Diego, California 92101

Project No. 042388-001

April 3, 2009



Leighton and Associates, Inc.

A LEIGHTON GROUP COMPANY



Leighton and Associates, Inc.

A LEIGHTON GROUP COMPANY

April 3, 2009

Project No. 042388-001

To: Centre City Development Corporation.
 401 B Street, Suite 400
 San Diego, California 92101

Attention: Mr. Scott Johnson

Subject: Geotechnical and Fault Investigation, Bayside Fire Station
 San Diego, California

In accordance with your request and authorization, we have conducted a geotechnical and fault investigation of the property for the design and construction of the proposed fire station.

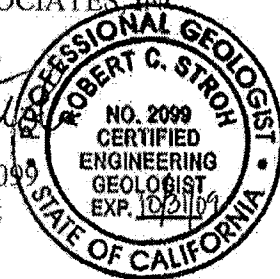
Based on the results of our study, it is our professional opinion that the site is suitable to receive the proposed improvements. The accompanying report presents a summary of our current investigation and provides geotechnical conclusions and recommendations relative to the proposed site development.

If you have any questions regarding our report, please do not hesitate to contact this office. We appreciate this opportunity to be of service.

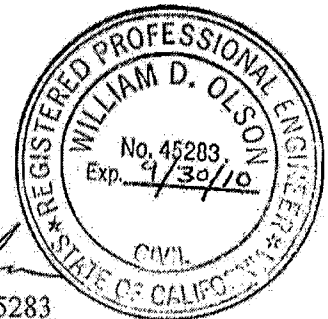
Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Robert C. Stroh
 Robert C. Stroh, CEG 2099
 Senior Project Geologist



William D. Olson
 William D. Olson, RCE 45283
 Associate Engineer



Distribution: (4) Addressee

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1.0 INTRODUCTION

1.1 Purpose and Scope

This report presents the results of our geotechnical investigation and fault hazard study at the subject site located at the southeastern corner of West Cedar Street and Pacific Highway in downtown San Diego, California (Figure 1). The intent of this report is to provide specific geotechnical conclusions and recommendations for the currently proposed project.

Also, the site lies within the City of San Diego's Special Studies Zone as defined by the City's Seismic Safety Study. Projects within these areas require a site specific fault hazard investigation to evaluate the potential hazards associated with possible faulting at the site. To address such fault hazards, Leighton performed a fault hazard investigation for the site that is also included in this report.

1.2 Site Location and Description

The site consists of two parcels located at the southeastern corner of West Cedar Street and Pacific Highway, together of which define the site limits of approximately 100 feet by 100 feet square (Figure 2). The site is currently occupied by a one story structure (taco shop) with drive through, covered patio addition, and associated paved parking. The existing structure occupies roughly the northwestern portion of the site. Site use previously consisted of a service station with underground storage tanks, which have been subsequently removed. It should be noted that an environmental assessment of the site was not within the scope of this report.

Site topography is nearly level with a slight descending gradient towards the southwest with an elevation differential of about 3 feet. Specifically, the highest portion of the site is located to the northeast and the lowest located to the southwest corner. Site elevations range between approximately 12 and 15 feet above mean sea level (msl).

Site Latitude and Longitude

32.72174° N

117.17069° W

1.3 Proposed Development

We understand that the subject property is being considered for redevelopment consisting of construction of a new fire station. Based on our review of the preliminary development plans by Centre City Development Corporation, dated May 25, 2006, both parcels will be



used for a proposed fire station. Existing site improvements are proposed to be demolished. The new fire station is currently proposed to consist of the main ground floor to contain three bays for fire trucks or vehicles, a second floor to consist of various facilities such as shop, watch room, turnouts, and a third floor to consist of housing quarters (bunks), kitchen, dining, deck and dayroom. A basement for private vehicular parking is also planned for the structure. We anticipate that the basement will be one level in depth (i.e., 10 to 12 feet below the existing ground surface), and will encompass the footprint of the proposed structure (Figure 2).



2.0 SUBSURFACE EXPLORATION AND LABORATORY TESTING

2.1 Site Investigations

Subsurface explorations have been performed on the site. Our exploration consisted of the excavation of 2 small diameter (8-inch) hollow-stem auger borings drilled to depths of 41.5 feet below the existing ground surface (bgs). The borings (B-1 through B-2) were performed within the limits of the current project site (Figure 2) and characterize the onsite soils, including those likely to be encountered at and below the proposed foundation elevations for this project. The boring logs record the number of blows necessary to drive either a Standard Penetration Test (SPT) sampler or a California sampler at each sampling location (Appendix B).

In addition, we performed a site specific fault hazard evaluation (Leighton, 2007) that included the excavation of two exploration trenches (T-1 through T-2) at the site (Figure 2). A total of approximately 185 lineal feet of trench was excavated in order to provide adequate coverage against faulting across each of the parcels. Due to caving conditions, we also performed four cone penetration test soundings (CPTs) to depths of 50 feet. Trench and CPT locations are presented on Figure 2. CPT logs are provided in Appendix B. Trench logs are provided on Figures 6 and 7.

2.2 Laboratory Testing

Laboratory testing performed on soil samples representative of on-site soils obtained during the recent subsurface exploration included tests of moisture and density, shear strength, grain size, and a screening geochemical analysis for corrosion. A discussion of the laboratory tests performed and a summary of the laboratory test results are presented in Appendix C. In-situ moisture and density test results are provided on the boring logs (Appendix B).



3.0 SUMMARY OF GEOTECHNICAL CONDITIONS

3.1 Geologic Setting

The project area is situated in the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California, and varies in width from approximately 30 to 100 miles (Norris and Webb, 1990). The province is characterized by mountainous terrain on the east composed mostly of Mesozoic igneous and metamorphic rocks, and relatively low-lying coastal terraces to the west underlain by late Cretaceous-age, Tertiary-age, and Quaternary-age sedimentary units. Most of the coastal region of the County of San Diego, including the site, occur within this coastal region and are underlain by sedimentary units. Specifically, the subject site is located within the coastal plain section of the Peninsular Range Geomorphic Province of California, which generally consists of subdued landforms underlain by sedimentary bedrock.

3.2 Site-Specific Geology

The site is located near the western limits of a broad structural trough formed by downwarping and normal faulting along the Rose Canyon fault system. To the north and east of downtown San Diego, the early Pleistocene-age Lindavista Formation unconformably overlies the Pliocene-age San Diego Formation. Both the Lindavista and San Diego Formations are generally overlain in the site area by the middle to late Pleistocene-age Bay Point Formation (Kennedy, 1975), which generally consists of weakly to moderately cemented sandstone, siltstone, and gravel conglomerates.

Historically, the late Pleistocene marine and non-marine terrace deposits in the downtown San Diego area have been referred to as the Bay Point Formation. Geologic mapping by Kennedy (1975) indicate that the subject site is underlain by the late Pleistocene-age Bay Point Formation, which represents an estuarine and nearshore terrestrial environment. Generally these deposits consist of fossiliferous nearshore fine- to medium-grained sandstones, channel gravel-conglomerates, and estuarine siltstones/claystones.

Geologic mapping by Kennedy and Tan (2005), has revised some of the geologic units in the downtown San Diego Area and elsewhere within the San Diego Metropolitan area. Specifically, the Bay Point Formation has been re-grouped as an old surficial deposit. The new unit classification assigned to the Bay Point Formation in this recent publication is now "Old Paralic Deposit - Qop6", which correlates to the Nester Terrace (which was laid down approximately 125,000 years ago). Therefore, for the purpose of this study, we will refer to the surficial geologic units exposed at the site as "paralic deposits".



Specifically, within the site area, these paralic deposits overlie the San Diego Formation. However, the depth of this geologic contact is poorly constrained due to a lack of surface exposures, dated subsurface stratigraphy, and a general lack of fossils which could be utilized to identify the underlying San Diego Formation. Based on our experience in the site area, we anticipate that this geologic contact is at a depth of greater than 100 feet.

The approximate vertical distribution of lithologic units underlying the site is shown on the geologic cross-section provided in Cross-Section A-A' (Figure 3). A brief description of the geologic units encountered at the site is presented below. Horizontally, the units are generally continuous across the site.

3.2.1 Undocumented Fill and Colluvium (not mapped)

A generally thin (1-foot thick) veneer of undocumented artificial fill soils, apparently placed during the site's initial construction and/or previous demolition operations, were observed in various areas across the site. Locally undocumented fill soils were observed up to 6 feet in thickness across portions of Trench T-1, which may be related to Underground Storage Tank backfill. An as-graded report was not available for our review, and it is assumed that no engineering observations of these fill soils were provided at the time of grading. These fill soils generally consisted of dark brown to light brown, clayey sands, with a abundant gravels and construction debris, and trash observed throughout.

A wedge of colluvium that thickens toward the southwest was observed underlying the minor fill and overlying the paralic deposits. As encountered, the colluvium was generally light brown, moist, and loose, silty sands with abundant gravel. This unit was very friable and easily caved more so toward the southwestern portion of the site. Thicknesses ranged between approximately 6 feet and 8 feet along the southern boundary of the site.

3.2.2 Old Paralic Deposits (Map Symbol – Qop6)

Middle to late Pleistocene-aged paralic deposits underlie the entire site, and extend to depths of at least 100 feet below existing ground surface (bgs). Soil characteristics primarily consists of red-brown to brown and gray, medium dense, fine- to medium-grained, silty to clayey sand. Zones of poorly graded sand with silt and scattered gravels were also observed within this unit.

As encountered in our explorations, these deposits generally consisted of fine- to medium-grained sandstones to claystones. In our trench explorations, the sandstones encountered during our study were generally light reddish brown to



dark reddish brown containing manganese nodules, weakly to moderately cemented, slightly to moderately friable, and fine- to medium-grained with localized zones of coarse-grained sands. The sandy claystone encountered consisted of a brown, moist, stiff to hard and well indurated materials near the base of our trenches. In addition, our borings encountered friable light brown silty sandstones at depths below approximately 18 feet.

Based on our experience with similar sites in the downtown area, excavations within this unit will encounter zones of poorly-graded cohesionless sands that may cave or slough during unsupported site excavation and the performance of drilling excavation.

3.3 Surface and Ground Water

No indication of surface water or evidence of surface ponding was encountered during our fault study. However, during performance of the geotechnical borings, and the CPT soundings, we did observe ground water.

Ground water was observed in our borings at depths of approximately 16 feet bgs, corresponding to an elevation ranging between approximately -2 to -4 feet msl. However, previous studies performed at the site had indicated ground water elevations on the order of approximately +1 to +2 feet msl. To further corroborate stabilized ground water elevations at the site, we measured ground water levels within existing accessible monitoring wells at the site. Those measurements indicated ground water elevations between +1.0 and +1.5 feet msl. It is our opinion, that due to significant construction dewatering activities in this portion of downtown San Diego over the last 10 years, the ground water elevation has been significantly lowered below that of historical ground water elevations characteristic of the area. Therefore, we anticipate that ground water levels will eventually return to elevations above those currently measured. In addition, it should be noted that ground water levels may fluctuate during periods of precipitation and increased irrigation.

We anticipate the lowest finish floor of the basement structure will be very near the existing static ground water table at the site. Therefore, design for hydrostatic pressures should be considered. We also anticipate that temporary dewatering will be necessary to complete the excavation of the proposed basement, and in particular elevator shafts or other elements of the structure located at depths greater than the finish basement floor elevation.



3.4 Engineering Characteristics of On-site Soils

Based on the results of our laboratory testing of representative on-site soils, and our professional experience on similar sites with similar soils conditions, the engineering characteristics of the on-site soils are discussed below.

3.4.1 Expansion Potential

The expansion potential of the on-site soil is anticipated to be low with localized areas ranging up to medium. Geotechnical observations and/or laboratory testing upon completion of site grading are recommended to determine the actual expansion potential of finish grade soils on the site at the location of improvements.

3.4.2 Soil Corrosivity

A preliminary corrosive soil screening for the on-site materials was completed to evaluate their potential effect on concrete and ferrous metals. The corrosion potential was evaluated using the results of laboratory testing on one representative soil sample obtained during our subsurface evaluation.

Laboratory testing was performed to evaluate pH, minimum electrical resistivity, and chloride and soluble sulfate content. The sample tested had measured pH value of 7.7, and a measured minimum electrical resistivity of 1199 ohm-cm. Test results also indicated that the sample had a chloride content of 410 parts per million (ppm), and soluble a sulfate content of less than 0.0150 percent (by weight in soil).

3.4.3 Excavation Characteristics

The site is underlain by undocumented fill/colluvium and paralic deposits with silty to clayey sand and poorly graded sands with localized cobble-gravel conglomerates. With regards to the proposed project, it is anticipated these on-site soils can be excavated with conventional heavy-duty construction equipment. Note that zones of poorly graded sand may cave or slough during unsupported excavations. Oversize cobble material (typically over 6 inches in maximum dimension) is present locally in the colluvial materials underlying the site and may be encountered locally elsewhere during excavation. Oversize cobble material should be placed in non-structural areas or hauled off-site.



4.0 FAULTING

4.1 Regional Tectonic Setting

During the late Pliocene, several new faults developed in Southern California, creating a new tectonic regime superposed on the flat-lying section of Tertiary and late Cretaceous rocks in the San Diego region. One of these fault systems is the Rose Canyon Fault Zone.

In Southern California, approximately 50 mm/yr of dextral shear is accommodated across the broad Pacific-North American plate margin (DeMets, et al., 1990), collectively termed the San Andreas fault system. San Diego lies within this fractured margin, resulting in the potential for both local and regional seismic sources. At the latitude of San Diego, strain in southern California and northern Baja California is principally expressed as northwest-trending slivers of crystalline rock separated by the several active faults of the system.

The principal known onshore faults in southernmost California are the San Andreas, San Jacinto, Elsinore, Imperial and Rose Canyon faults, which collectively transfer the majority of this deformation, about 40-45 mm/yr (Savage et al., 1979). The balance of the plate margin slip, about 5-7 mm/yr, is taken by the offshore zone of faults which include the Coronado Bank, Descanso, San Diego Trough, and San Clemente faults off of the San Diego and northern Baja California coastline (Legg, 1985; Rockwell et al., 1993). Most of the offshore faults coalesce south of the international border, where they come onshore as the Agua Blanca fault which transects the Baja California peninsula (Rockwell et al., 1993).

The Rose Canyon Fault Zone, which bisects the City of San Diego, is part of this family of northwest-striking strike-slip faults in southernmost California (Kennedy, 1975; Kennedy and Welday, 1980; Legg, 1985; Treiman, 1993; Lindvall and Rockwell, 1995). In San Diego, the principal faults in the zone are the Rose Canyon, Mount Soledad, Old Town and La Nacion faults. Numerous secondary faults are also mapped (Kern, 1988), although many of these clearly are not considered active.

4.2 Rose Canyon Fault Zone in San Diego

The Rose Canyon Fault was first recognized by Fairbanks (1893). He described the feature as an area of uplifting or folding from La Jolla Bay to the Soledad Hills. Since that time, numerous others have mapped the Rose Canyon Fault and have attributed the formation of several physiographic features such as, Mount Soledad, Mission Bay, and San Diego Bay to the activity along the fault. The Rose Canyon Fault Zone (RCFZ) consists of predominantly right-lateral strike-slip faults that extend southwest to southeast through the San Diego metropolitan area (Figure 4). Movement along the fault zone is



generally complex and consists of various combinations of oblique, normal and strike-slip motion. The fault zone extends offshore at La Jolla and continues north-northwest subparallel to the coastline. To the south in the San Diego downtown area the fault zone appears to splay out into a group of generally right-normal oblique faults extending into San Diego Bay (Treiman, 1993).

South of downtown San Diego, the major faults making up the southern end of the Rose Canyon fault zone are the Spanish Bight, Coronado, and Silver Strand faults. The east side of the zone is represented by the La Nacion Fault (Treiman, 1993). Together, these faults define a wide and complexly faulted basin occupied by San Diego Bay and a narrow section of the continental shelf west of the Silver Strand.

4.2.1 Mapped Fault Zones

Within downtown San Diego, there are currently two recognized areas of active faulting, the Downtown Graben and the San Diego Fault (Figure 5). Specifically, the site is located approximately 5,000 feet west of the mapped northeastern edge of the Downtown Graben, and approximately 2,500 feet northwest of the San Diego Fault (CGS, 2003).

By definition of the California Mining and Geology Board has defined an active fault has a fault which has had surface displacement within Holocene time (about the last 11,000 years). The State Geologist has defined a potentially active fault as any fault considered to have been active during Quaternary time (last 1,600,000 years). This definition is used in delineating Special Studies Zones as mandated by the Alquist-Priolo Geologic Hazards Zones Act of 1972 and as subsequently revised in 1975, 1985, 1990, 1992, 1994 and 1997 (Hart, and Bryant, 1997). The intent of this act is to assure that unwise urban development does not occur across the traces of active faults.

In 2003, the California Geologic Survey (CGS) revised the existing fault zones that were originally established in 1991. Included in this revision were the addition of the Silver Strand, Coronado, Spanish Bight and San Diego Faults as active Earthquake Fault Zones (EFZ), and an extension to the south of the EFZ located in downtown San Diego. Figure 5 shows the currently revised boundaries of the EFZ's. The site is not located within a State mapped EFZ.

Also, in response to recognized active faulting in the downtown San Diego Metropolitan area, the City of San Diego created a Special Study Zone for the evaluation of onsite faulting (Figure 5). The City has added this downtown zone as an amendment to the utilized 1991 Uniform Building Code thus requiring that a fault study be performed prior to site development or a change in use affecting



ownership or human habitation within that zone. Although similar to the State definition, the City of San Diego (1999) defines a Potentially Active fault, as a fault that has had activity within the last 1.6 million years (Quaternary Period) and can be demonstrated to be inactive during the last 11,000 years (Holocene Epoch). The site is located within the City Special Study Zone.

4.3 Review of Previous Fault Studies

Previous geotechnical reports and fault studies have been performed within the site area and for nearby parcels to the south of the subject site. As part of our study we reviewed the exploration logs performed for a fault study by Law Crandall (1999) and URS (2006), for sites located both north and south of the subject site. The results of the Law Crandall study did not indicate the presence of faulting or faulting that would project toward the subject site. However, the results of the URS study indicated the presence of a potentially active fault projecting toward the northwestern portion of the site. It is our understanding that complete copies of the reports may be obtained publicly through the City of San Diego Development Services Department and CCDC, respectively. It should be noted, that we concur with the findings and conclusions of both studies.

4.4 Review of Vintage Maps and Aerial Photographs

We performed a review of topographic maps covering the site area, the oldest of which dates to 1902 at a scale of 1:52,000. Due to scale, this map is not very useful regarding the identification of geomorphic topographic features characteristic of faulting. Our review of a City of San Diego topographic survey from 1954 was more useful and displays relatively uniform topographic contours and a gentle gradient toward the southwest. No topographic expressions characteristic of active faulting (scarps, lineaments, sags, or sudden changes in topography) were observed during our review.

We also analyzed 1928 and 1953 aerial photography of the site on file at the County of San Diego Mapping and Cartography division. Our review of aerial photography did not predate site development. Nevertheless, we did not see indications of topography that would be indicative of active faulting. In general, the reviewed photos were not useful in our evaluation with regard to observing tonal variations that are characteristic of active faulting.



4.5 Age Assessment

In order to determine the age of the latest faulting at the site, unfaulted soils overlying subject site faults would need to exist. The most common method utilized is to collect soil samples containing charcoal (carbon). During our logging of the trenches, no visible charcoal was noted within the stratigraphic units. Therefore, we obtained a bulk soil sample from within unfaulted materials unit overlying faulted materials. While the quantity of carbon required to perform 14C accelerator mass spectrometer (AMS) age dating is minute (on the order of approximately 100 micrograms to 300 micrograms of final carbon), our processed soil materials sampled at the subject site yielded an inadequate amount of suitable charcoal to perform 14C age analysis.

Therefore, the relative ages of the geologic units exposed in the trenches were estimated using both comparisons of exposed units to descriptions of stratigraphy in the San Diego region (Kennedy, 1975; Kennedy and Tan, 2005) and by soil stratigraphic techniques (Borchardt, 2002; Birkeland, 1991; and Rockwell, 1998). With regard to soil stratigraphic techniques, we looked at the development of pedogenic (ped) surfaces, the amount and thickness of translocated clay films, the color of the soils, the looseness or induration and cementation of the sediments, the amount of iron oxides, manganese oxides, soluble salts, and calcium carbonates, among other characteristics, to evaluate whether the sediments exposed are Holocene or pre-Holocene in age (older than 11,000 years).

4.6 Site-Specific Fault Investigation

We performed two exploration trenches totaling approximately 185 lineal feet in length in order to provide coverage against faulting across the site (Figure 2). Trench logging was performed by a California Certified Engineering Geologist (CEG) from this office. The trench sidewalls were scraped utilizing various hand-held digging tools to remove clay smears and gouge marks resulting from the excavation equipment. Logging of trench sidewalls was performed at a scale of 1 inch equals 5 feet. Stations were marked at 5-foot intervals on the ground surfaces at the top of the trenches and then measured down from the top of the ground surface to prepare a graphic log. Trench locations (end points of logged trench walls) were located using existing site features for reference points and measured using a cloth measuring tape. Trench logs for T-1 and T-2 are presented on Figure 6 and Figure 7.

4.6.1 Site Faulting

As previously mentioned, the fault study performed by URS (2006) north of the subject site encountered a fault projecting toward the northwestern portion of the



subject site. Based on the results of trench exposures, URS classified the fault as Potentially-Active following City of San Diego guidelines.

Our trenching exploration was performed to intersect the projected location of this fault and other possible unknown faults that could transect the site. The results of our trenching indicated that a fault transects the northwestern portion of the subject site. It is unknown if this fault is the same fault encountered in the URS (2006) study since the projected locations match only approximately.

Specifically, the fault observed transecting the site consists of a 4-foot wide zone of minor faults located between approximately Stations 65 and 70 in Trench T-1 (Figure 6). As observed, the faults had variable orientations ranging between approximately N10°W and N-S, with near vertical dips. No clay infilling was observed and the character of the faulting was tight. No evidence for significant vertical displacement was observed in the faulted unit, and it appears that pedogenic processes have caused the undulatory nature of the contact between the two mapped lithologic units in the paralic deposits at the location of the observed faulting. In addition, faulting is observed to terminate within the middle to late Pleistocene-age paralic deposits and did not break a weakly developed pedogenic E-Horizon within the Pleistocene-age paralic deposits. From a lateral (map view) perspective, these minor faults are considered discontinuous since they die-out southward, as demonstrated by the lack of faulting in Trench T-2 (Figure 7).



5.0 SEISMICITY

5.1 Seismicity

Historically, the San Diego region has been spared major destructive earthquakes. However, according to the United States Geological Survey (USGS), National Earthquake Information Center (NEIC), and California Geologic Survey (CGS) databases covering earthquake history from 1735 to the present (January 2008), 15 major earthquakes (> M 5.0), have been recorded within approximately 100 kilometers of the subject site. The site is considered to lie within a seismically active region, as can all of Southern California.

Regional faults within 100 kilometers of the site that are considered capable of producing significant seismic shaking at the site are summarized in Table 1. The slip rates and maximum magnitude events are based on the statewide probabilistic seismic hazard assessment (CDMG, 1996) and the subsequent update of that report (CGS, 2003). The maximum magnitude earthquake is the maximum expectable earthquake given the known tectonic framework.

Fault	Geometry	Closest Distance from Fault to Site		Maximum Moment Magnitude	Average Slip Rate (mm/yr)
		Miles	Kilometers		
Rose Canyon	Right Lateral, Strike Slip	0.2	0.3	7.2	1.5
Coronado Bank	Right Lateral Strike Slip	12.6	20.3	7.6	3
Newport-Inglewood (Offshore)	Right Lateral, Strike Slip	33.6	54.0	7.1	1.5
Elsinore (Julian Segment)	Right Lateral Strike Slip	41.7	67.1	7.1	5
Elsinore (Temecula Segment)	Right Lateral, Strike Slip	46.2	74.3	6.8	5
Earthquake Valley	Right Lateral, Strike Slip	46.7	75.2	6.5	2
Elsinore (Coyote Mountain Segment)	Right Lateral, Strike Slip	49.9	80.3	6.8	4
Palos Verdes	Right Lateral, Strike Slip	59.2	95.2	7.3	3

As indicated in Table 1 above, the Rose Canyon fault is located closest to the site. In addition, based on deaggregation of the USGS Model values, the Rose Canyon fault is the 'active' fault considered having the most significant effect at the site from a design



standpoint. Based on our deterministic site analysis, a maximum credible earthquake of moment magnitude M7.2 on the Rose Canyon fault could produce an estimated peak horizontal ground acceleration of 0.68g at the site.

5.1.1 Building Code Seismic Parameters

The effect of seismic shaking may also be mitigated by adhering to the California Building Code or state-of-the-art seismic design parameters of the Structural Engineers Association of California. The following geotechnical design parameters have been determined in accordance with the 2007 CBC (CBSC, 2007) and the USGS Ground Motion Parameter Calculator (Version 5.0.7):

Table 2 CBC (2007) Seismic Code - Parameters for the Site			
Description	Values		CBC Reference
Site Class	D		Table 1613.5.2
Short Period Spectral Acceleration	S_s	1.568	Figure 1613.5(3)
1-Second Period Spectral Acceleration	S_1	0.613	Figure 1613.5(4)
Short Period Site Coefficient	F_a	1.0	Table 1613.5.3(1)
1-Second Period Site Coefficient	F_v	1.5	Table 1613.5.3(2)
Adjusted Short Period Spectral Acceleration	S_{MS}	1.568	Equation 16-37
Adjusted 1-Second Period Acceleration	S_{M1}	0.920	Equation 16-38
Design Short Period Spectral Response Parameter	S_{DS}	1.046	Equation 16-39
Design 1-Second Period Spectral Response Parameter	S_{D1}	0.613	Equation 16-40

Secondary effects that can be associated with severe ground shaking following a relatively large earthquake include shallow ground rupture, soil liquefaction and dynamic settlement, lateral spreading, seiches and tsunamis. These secondary effects of seismic shaking are discussed in the following sections:



5.2 Seismic Hazards

Severe ground shaking is most likely to occur during an earthquake on one of the regional active faults in Southern California. The effect of seismic shaking may be mitigated by adhering to the California Building Code or state-of-the-art seismic design parameters of the Structural Engineers Association of California. Secondary effects associated with severe ground shaking following a relatively large earthquake which may affect the site shallow ground rupture, soil liquefaction and dynamic settlement, seiches and tsunamis. These secondary effects of seismic shaking are discussed in the sections below.

5.2.1 Shallow Ground Rupture

As previously discussed, a potentially active fault was encountered in Trench T-1 transecting the northwestern portion of the subject site. Potentially active faults are considered to have a very low potential for surface rupture in the San Diego area. In addition, the fault was observed to terminate within late Pleistocene-age paralic materials. No active faults are mapped crossing the site and the site is not located within a mapped Alquist-Priolo Earthquake Fault Zone (Hart, and Bryant, 1997). Therefore, due to the absence of active faults at the site, surface rupture hazard due to faulting is considered very low. Ground cracking due to shaking from a seismic event is not considered a significant hazard either, since the site is not located near slopes.

5.2.2 Liquefaction and Dynamic Settlement

Liquefaction and dynamic settlement of soils can be caused by strong vibratory motion due to earthquakes. Granular soils tend to densify when subjected to shear strains induced by ground shaking during earthquakes. Research and historical data indicate that loose granular soils underlain by a near surface ground water table are most susceptible to liquefaction, while the most clayey materials are not susceptible to liquefaction. Liquefaction is characterized by a loss of shear strength in the affected soil layer, thereby causing the soil to behave as a viscous liquid. This effect may be manifested at the ground surface by settlement and, possibly, sand boils where insufficient confining overburden is present over liquefied layers. Where sloping ground conditions are present, liquefaction-induced instability can result.

For consideration in liquefaction analysis, and based on deaggregation of the Maximum Considered Earthquake event, a magnitude M6.92 is associated with the Design Earthquake Ground Motion. Our liquefaction analysis was performed



utilizing the procedures of Robertson and Wride and NCEER guidance (Youd, T.L., Idriss, I.M. and Others, 2001). In addition, we utilized simplified methods proposed by Tokimatsu and Seed (1987), and Ishirara and Yosemite (1990) involving SPT N-values, and CPT data, respectively to estimate earthquake-induced soil settlement at the site.

Based on our analysis (Appendix D), the underlying paralic deposits are not typically subject to liquefaction based on their age and relatively dense state; however, localized pockets or discontinuous layers may have a potential to liquefy (e.g., CPT-1 between approximately 15 and 35 feet).

Based on the results of our analysis, earthquake-induced settlements are anticipated to be less than 1 inch, excluding the result found in CPT-1 which encountered a localized pocket of potentially liquefiable soil. In general, the differential earthquake-induced settlements at the site are anticipated to be on the order of 1-inch or less within 50 horizontal feet considering an overall evaluation of the site (i.e., an approximate angular distortion of 1/600). Based on these relatively small settlements, the building designers should consider a dynamic settlement of 1-inch in their structural analysis and provide appropriate structural mitigation for this liquefaction hazard.

5.2.3 Lateral Spread

Empirical relationships have been derived (Youd et al., 1999) to estimate the magnitude of lateral spread due to liquefaction. These relationships include parameters such as earthquake magnitude, distance of the earthquake from the site, slope height and angle, the thickness of liquefiable soil, and gradation characteristics of the soil.

Based on the anticipated proposed surface grades (topography) and the subsurface conditions of the site, the potential for lateral displacement toward a free-face and ground slope conditions during the design ground motion is very low. This determination is based on the soil profiles encountered in the exploratory borings and soundings, and the observation that the liquefiable soils underneath the site were deposited in relatively discontinuous layers.



5.2.4 Tsunamis and Seiches

Tsunamis are long wavelength seismic sea waves (long compared to the ocean depth) generated by sudden movements of the ocean bottom during submarine earthquakes, landslides, or volcanic activity. A seiche is an oscillation (wave) of a body of water in an enclosed or semi-enclosed basin that varies in period, depending on the physical dimensions of the basin, from a few minutes to several hours, and in height from several inches to several feet. A seiche is caused chiefly by local changes in atmospheric pressure, aided by winds, tidal currents, and occasionally earthquakes.

Specifically, southern California is oriented obliquely (i.e., not directly in line) with the major originating tsunami zones, and it has a relatively wide (about 220 kilometers) and rugged continental shelf (or borderland) that acts as a diffuser and reflector of remotely generated tsunami wave energy (Joy, 1968). These conditions, in addition to the geologic and seismic conditions (such as the strike-slip fault regime and the infrequent large submarine earthquakes) along the coastline, also tend to minimize the likelihood of a large tsunami at the site. For example, tsunami wave heights and runup elevations experienced along the San Diego coastline during the last 170 years have fallen within the normal range of tidal fluctuations.

Based on the factors discussed above, a site elevation of approximately 12 feet msl, and the distance the site is located from the Pacific coastline (approximately 2.6 miles), there is a low potential for flood damage to occur at the site from a tsunami or seiche.

5.2.5 Flood Hazard

According to a Federal Emergency Management Agency (FEMA) flood insurance rate map (FEMA, 1997), the site is not located within a floodplain. Based on our review of topographic maps, the site is not located downstream of a dam or within a dam inundation area. Based on this review and our site reconnaissance, the potential for flooding of the site is considered very low.



6.0 CONCLUSIONS

Based on the results of our geotechnical investigation of the site, it is our opinion that the proposed development is feasible from a geotechnical standpoint, provided the following conclusions and recommendations are incorporated into the project plans and specifications.

- Based on the results of our subsurface explorations, the static groundwater table is located between elevations of approximately +1.0 to +1.5 feet above msl. In addition, we anticipate that ground water will be encountered during construction of the proposed subterranean basement foundation excavation. In addition, dewatering during construction is anticipated, and methods of waterproofing will be required to mitigate the long-term potential of water infiltration into the basement. Note that for the design of the basement structure, we recommend using a higher ground-water elevation of +6 feet msl.
- Based on the results of our geotechnical evaluation, it is our opinion that the proposed building with basement structure should be supported on a reinforced concrete mat foundation supported in the underlying parallel deposits.
- Excavations at the site will require temporary shoring to facilitate construction and to reduce the potential vertical and horizontal ground movements (i.e. damage) beneath the existing public streets and adjacent improvements.
- The undocumented fill soils onsite are potentially compressible. These soils are not considered suitable for structural loads or support of engineered fill soils or site improvements in their present condition. We anticipate that these materials will be removed during performance of the proposed basement excavation.
- The site is located within a Special Study Zone created by the City of San Diego to evaluate the potential for onsite faulting. Based on the results of our fault exploration study, a Potentially Active (per City of San Diego criteria) fault transects the northwestern portion of the site. In our opinion, building set-backs are not warranted from the faults encountered. Based on the results of our fault exploration study, no "Active" faults transect the site. From a geologic and geotechnical perspective, it is also our professional opinion that the proposed project and land use is appropriate for the site. It should be noted, that the City of San Diego will require geologic mapping be performed throughout the excavation process to corroborate our professional opinion regarding site faulting. In addition, the City will require a "Notice of Geologic and Geotechnical Conditions" be recorded for the site.
- Based on the results of our subsurface exploration, we anticipate that the onsite materials should be generally rippable with conventional heavy-duty earthwork equipment. However, it should be noted that localized gravel and cobble layers may exist that impede drilling. In addition, unknown items such as buried concrete footings left from previous site development should be anticipated.



- Based on our experience with similar sites in the downtown area and the results of our subsurface investigation of the site, excavations within the underlying soil materials may encounter zones of poorly graded cohesionless and friable sands that will likely cave or slough during site excavation. Care in these cases should be exercised which may include the excavation of shorter open-face segments.
- Based on laboratory testing and visual classification, materials derived from the on-site soil materials possess a low expansion potential, although locally more expansive materials may be encountered.
- Although Leighton does not practice corrosion engineering, laboratory test results indicate the soils present on the site have a negligible potential for sulfate attack on normal concrete. The onsite soils are considered to be corrosive to buried uncoated ferrous metals. A corrosion consultant should be consulted.
- The existing onsite soils are suitable material for fill construction provided they are relatively free of organic material, debris, and rock fragments larger than 6 inches in maximum dimension.
- The underlying alluvial deposits are not typically subject to liquefaction based on their age and relatively dense state; however, localized zones or discontinuous layers may have a potential to liquefy. The total earthquake-induced settlements is anticipated to be less than 1 inch and differential earthquake-induced settlements are anticipated to be on the order of 1-inch or less within 50 horizontal feet considering an overall evaluation of the site (i.e., an approximate angular distortion of 1/600).



7.0 RECOMMENDATIONS

7.1 Earthwork

We anticipate that earthwork at the site will consist of site preparation, installation of shoring, excavation, and placement of backfill. We recommend that earthwork on the site be performed in accordance with the following recommendations and the General Earthwork and Grading Specifications for Rough Grading included in Appendix E. In case of conflict, the following recommendations shall supersede those in Appendix E.

7.1.1 Site Preparation

Prior to grading, all areas to receive structural fill or engineered structures should be cleared of surface and subsurface obstructions, including any existing debris and undocumented or loose fill soils, and stripped of vegetation. Removed vegetation and debris should be properly disposed off-site. All areas to receive fill and/or other surface improvements should be scarified to a minimum depth of 6 inches, brought to above-optimum moisture conditions, and recompact to at least 90 percent relative compaction (based on ASTM Test Method D1557).

7.1.2 Excavations and Oversize Material

Excavations of the onsite materials may generally be accomplished with conventional heavy-duty earthwork equipment. Although not anticipated, local heavy ripping or breaking may be required if strongly cemented formational material is encountered.

Surficial soils along with friable underlying sands present on site may cave during trenching and excavation operations. In accordance with OSHA requirements, excavations deeper than 5 feet should be shored or be laid back in accordance with Section 7.2 if workers are to enter such excavations. Shoring recommendations are presented in Section 7.4.6.

7.1.3 Removal and Recompaction

Undocumented fill soils not removed by the planned grading should be excavated, moisture-conditioned, and then compacted prior to placing any additional fill or improvements (such as flatwork, etc.). In areas surrounding the planned excavation that receive fill or other surface improvements, these soils should be



removed down to competent parallel deposits and recompact to proposed grades. The thickness of these soils may vary across the site and may be locally deeper in certain areas. Also, the contractor should note that, as typical in areas of redevelopment, buried septic systems and/or foundations may be encountered which may necessitate deeper removals or other remedial grading/excavation.

7.1.4 Engineered Fill Placement and Compaction

The onsite soils are generally suitable for use as compacted fill provided they are free of organic material, debris, and rock fragments larger than 6 inches in maximum dimension. The onsite soils typically possess a moisture content below optimum and may require moisture conditioning prior to use as compacted fill. All fill soils should be brought to above-optimum moisture conditions and compacted in uniform lifts to at least 90 percent relative compaction based on laboratory standard ASTM Test Method D 1557 and 95 percent relative compaction for wall backfill soils if used for structural purposes, such as to support a footing. The optimum lift thickness required to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in lifts not exceeding 8 inches in thickness.

Placement and compaction of fill should be performed in general accordance with the current City of San Diego grading ordinances, sound construction practice, and the General Earthwork and Grading Specifications for Rough Grading presented in Appendix E.

7.1.5 Expansive Soils and Selective Grading

It is not anticipated that highly expansive soils will be encountered during site grading. We anticipate that the cuts for the structure will be excavated into material that has a very low to low potential for expansion. Expansion testing should be performed on the finish grade soils to verify their expansion potential. If highly expansive soils are present within 5 feet of finish grade, special foundation and slab considerations will be required.



7.1.6 Utility Trench Excavation and Backfill

All excavation work should comply with the current requirements of OSHA. Trenches (either open or backfilled) which parallel structures, pavements, or flatwork should be planned so that they do not extend below a plane having a downward slope of one vertical and two horizontal from a line nine inches above the bottom edge of footings, pavements, or flatwork. Also, no parallel trenches should be closer than 1.5 feet from the closest edge of footings, pavements, or flatwork. Should it be necessary to locate parallel trenches which do not meet the criteria recommended above for footings at conventional depth, we recommend that the footing depths be increased until the criteria are met. A check should be made by the civil designer to verify that all trenches comply with the setback recommendations of this paragraph. If there are special cases where these requirements are not practical, the civil designer should communicate with the project geotechnical engineer and architect on a case-by-case basis.

Pipe bedding should consist of sand with a sand equivalent (SE) of not less than 30. Bedding should be extended the full width of the trench for the entire pipe zone, which is the zone from the bottom of the trench, to one foot above the top of the pipe. The sand should be brought up evenly on each side of the pipe to avoid unbalanced loads. Onsite materials will probably not meet bedding requirements. Except for predominantly clayey soils, the onsite soils may be used as trench backfill above the pipe zone provided they are free of organic matter and have a maximum particle size of three inches. Compaction by jetting or flooding is not recommended.

7.2 Temporary Excavations

Sloping excavations may be utilized when adequate space allows. Based on the results of our evaluation, we provide the following recommendations for sloped excavations in fill soils/colluvium or competent formational materials without seepage conditions.

Excavation Depth (feet)	Maximum Slope Ratio In Fill Soils/Colluvium	Maximum Slope Ratio In Competent Formation
0 to 5	1.5:1 (Horizontal to Vertical)	Vertical
5 to 20	1.5:1 (Horizontal to Vertical)	1:1 (Horizontal to Vertical)

The above values are based on the assumption that no surcharge loading or equipment is present within 10 feet of the top of slope. Care should be taken during design of



excavations adjacent to the existing structures so that foundation support is preserved. A "competent person" should observe the slope on a daily basis for signs of instability.

7.3 Surface Drainage and Erosion

Surface drainage should be controlled at all times. The proposed structure should have appropriate drainage systems to collect roof runoff. Positive surface drainage should be provided to direct surface water away from the structures toward the street or suitable drainage facilities. Planters should be designed with provisions for drainage to the storm drain. Ponding of water should be avoided adjacent to the structure.

7.4 Preliminary Foundation and Slab Considerations

Conventional foundations (spread and continuous footings) and/or structural mat foundations are considered suitable for support of the proposed structure provided the footings are embedded into competent dense native formational materials as recommended herein. A mat foundation should be used for the basement structure, if it is proposed to be below the elevation of +6 feet msl which is the recommended ground water elevation for design.

These recommendations are preliminary and should be reviewed and revised, as necessary, once the actual size and configuration of the project has been confirmed. Foundations and slabs should be designed in accordance with structural considerations and the following recommendations. These recommendations assume that the soils encountered within 5 feet of finish grade have a very low to medium potential for expansion. If highly expansive soils are encountered and selective grading cannot be accomplished, additional foundation and slab design may be necessary.

7.4.1 General Subgrade Preparation

Due to anticipated friable sands and/or saturated soils at currently proposed foundation elevations, the subgrade may need to be stabilized to support equipment and workers during construction to prevent disturbance and possible sloughing of footing excavations. To provide a uniform and stabilized working surface for the, we recommend that the subgrade area be overexcavated to a depth of about 6 inches and backfilled with a concrete "mud slab." The actual thickness of the mud slab should be evaluated by the Contractor. As an alternative, the subgrade may be left undisturbed state. If disturbance and/or desiccation of the subgrade occur during construction, moisture conditioning and recompaction in accordance with Section 7.1.4 should be performed prior to placement of the foundation or slab elements.



7.4.2 Shallow Foundation Design

Shallow conventional foundations for associated ancillary structures founded in properly compacted engineered fill or competent native materials should be designed based on an allowable bearing capacity of 2,500 psf. This capacity assumes a minimum foundation depth of 18 inches and minimum width of 18 and 12 inches for spread and continuous footings, respectively. This capacity may also be increased by 500 psf per each additional foot of embedment up to a maximum of 3,500 psf.

The above capacities are for dead plus live loads and may be increased by one-third for short-term wind or seismic loads. The recommended allowable-bearing capacity is based on a maximum total and differential settlement of 1 to 1.5 inches and a differential of ¼-inch, respectively.

7.4.3 Mat Foundation Design

The subsurface structure must be designed to resist the hydrostatic buoyancy forces resulting from the high ground water conditions at the site. This requirement favors the use of a structural mat for both foundation support and to resist the hydrostatic forces associated with a potential ground water elevation of +6 feet msl. Thickness and reinforcement of the mat foundation should be in accordance with the design of the project structural engineer. However, we anticipate that the mat foundation will be on the order of 2 feet thick. If any of the soils exposed at foundation grades are disturbed during the excavation process, they should be excavated to suitable competent formational materials.

We recommend that the proposed structure may be founded on a mat foundation supported on competent formational material using a static long term allowable bearing capacity not to exceed 5,000 pounds per square foot. Based on our experience, seismic bearing pressures below the mat are often more than twice the static bearing pressures.

Mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the soils underlying the mat. A design coefficient of subgrade reaction k_s , of 120 to 170 pounds per cubic inch (pci) may be used for evaluating such deflections at the site. To account for edge conditions, the lower value should be considered at the center of the mat increasing to the higher value at the edges. Following preliminary foundation design by the structural engineer,



the contact pressure distribution and estimated settlement should be reviewed by Leighton.

7.4.4 Slab Design

Slabs-on-grade should be reinforced with reinforcing bars placed at mid-height in the slab. Slabs should have crack joints at spacings designed by the structural engineer. Columns should be structurally isolated from slabs. Slabs should be a minimum of 5 inches thick and reinforced with No. 3 rebar at 18 inches on center or No. 4 rebar at 24 inches on center (each way). The slab should be underlain by a 4-inch layer of clean sand or pea gravel. A moisture barrier should be placed at mid-height in the sand layer if reduction of moisture vapor up through the concrete slab is desired (such as below equipment, living/office areas, etc.). If additional loading is anticipated (i.e., basement floor slab with traffic loading), a slab thickness of at least 6 inches with reinforcement should be required.

7.4.5 Lateral and Hydrostatic Pressures

Lateral loads may be resisted by assuming a passive pressure of 300 psf per foot of depth and coefficient of friction of 0.35 between concrete and soil. The lateral resistance may be taken as the sum of the passive and frictional resistance, provided the passive resistance does not exceed two-thirds of the total resistance.

For design purposes, the following lateral earth pressure values for level or sloping backfill are recommended for walls backfilled with onsite soils of very low to low expansion potential or undisturbed in-place materials.

Conditions	Level	2:1 Slope
Active	35	55
At-Rest	45	65

Unrestrained (yielding) cantilever walls should be designed for an active equivalent pressure value provided above. In the design of walls restrained from movement at the top (non-yielding) such as basement walls, the at-rest pressures should be used. To account for potential redistribution of forces during a seismic event, basement walls should also be checked considering an additional seismic



pressure distribution equal to $(10)(H)$ applied as a uniform pressure (Figure 8). For this equation, H equals the overall retained height in feet. If conditions other than those covered herein are anticipated, the equivalent fluid pressure values should be provided on an individual case basis by the geotechnical engineer.

For portions of the wall not placed against shoring, the above values assume granular backfill and free-draining conditions to prevent buildup of hydrostatic pressure in the backfill. Backfill should meet the requirements for engineered fill materials described in Section 7.1.4 of this report, and should have a UBC expansion index of 30 or less. Wall backfill should be compacted by mechanical methods to at least 90 percent relative compaction in accordance with ASTM D 1557. All walls should be properly waterproofed.

Special cases such as combinations of sloping and shoring or other surcharge loads (not specified above) may require an increase in the design values recommended above. These conditions should be evaluated by the project geotechnical engineer on a case-by-case basis. Based on groundwater measurements made during our field investigation, it is not anticipated that braced excavations will be constructed below the groundwater table; therefore, the above pressures do not include hydrostatic pressures.

7.4.6 Shoring of Excavations

We anticipate excavations to be on the order of 12 to 15 feet bgs for the proposed basement. Accordingly, and because of the limited space, temporary shoring of vertical excavations will be required. We recommend that cuts be retained by a soldier beam and lagging shoring system deriving passive support from cast-in-place soldier piles and (lagging-shoring system) with tie-backs. Specialty engineers and contractors with knowledge of the downtown San Diego area soil conditions typically perform shoring of excavations of this size should be utilized for structural design and construction of the system.

Based on our experience with nearby projects, it is our opinion that the caving potential of the on-site soils is moderate. To accommodate installation of the shoring in the dense to hard underlying geologic units, wide-flange sections may be installed into pre-drilled holes surrounded by concrete. If caving of the drilled holes occurs, drilling slurry or casing may be required. In addition, caving of drilled holes for the tieback anchors below the groundwater table should be anticipated.

For design of temporary tie-back shoring we recommend a restrained active pressure of $20H$ assuming a rectangular distribution. Alternative shoring pressures



are depicted on Figure 9. All shoring systems should consider adjacent surcharging (such as the presence of dewatering equipment). The above pressures do not include hydrostatic pressures; it is assumed that any temporary shoring will not be subject to hydrostatic pressures because the ground water elevation will be generally lower than the bottom of the excavation. The pressures above assume the excavation will be free of water 5 feet below the bottom of the excavation and behind shoring elements. If shoring or soldier piles extend below the water table, the effects of ground water should be accounted for in the design of shoring. A uniform horizontal pressure equivalent to 2 additional feet of soil should be exerted against the walls that are adjacent to vehicular traffic.

For design of tie-backs, we recommend a concrete-soil bond stress of 1,000 psf of the concrete-soil interface area for straight shaft anchors installed by a competent contractor. This value should be considered only behind the 30 degree line (measured from the vertical) up from the base of the excavation. Temporary tie-back anchors should be individually proof-tested to 150 percent of design capacity. Further details and design criteria for tie-backs can be provided as appropriate. Since design of retaining systems is sensitive to surcharge pressures behind the excavation, we recommend that this office be consulted if unusual load conditions are anticipated. Care should be exercised when excavating into the on-site soils since caving or sloughing of these materials is possible. We recommend that the void space behind lagging be filled with sand/cement slurry. Field testing of tie-backs and observation of soldier pile excavations should be performed during construction.

7.4.7 Design Ground Water Elevation

As previously discussed in Section 3.3, ground water was observed in the existing ground water monitoring wells at depths of approximately 10.7 and 13.8 feet bgs, corresponding to an elevations ranging from approximately +1.0 to +1.5 feet msl. Ground water levels may fluctuate during periods of precipitation. To account for potential variation in ground water elevations across the site, we recommend using a ground water elevation of +6 feet msl for the calculating uplift pressures, mat foundation design, basement retaining wall design, and water proofing requirements.

7.4.8 Monitoring of Shoring

Settlement monitoring of adjacent sidewalks and structures should be performed to evaluate the performance of the shoring. Shoring of the excavation is the responsibility of the contractor. Extreme caution should be used to minimize



damage to existing pavement, utilities, and/or structures caused by settlement or reduction of lateral support. Sequencing of underpinning, shoring installation, excavation and dewatering will be critical to control of deflections and settlement. Once the shoring contractor is selected, a detail excavation phasing plan should be submitted and reviewed by the shoring designer and geotechnical engineer.

The shoring should be surveyed for vertical and horizontal deflection by the Civil Engineer at the top, mid-point, and bottom of each wall face (4 faces) at 50-foot intervals along the wall length. Vertical settlements should be surveyed along an alignment behind the wall at each of the mid-wall monitoring points to a distance behind the wall equal to 1/2 times the wall height. The survey points should be established prior to the start of construction and continued on a weekly basis as the construction proceeds and while the excavation remains open. After completion of the excavation, the survey interval may be extended based on evaluation by the geotechnical consultant.



7.5 Dewatering

Dewatering of the basement excavation will be required to complete construction. As previously mentioned, the highest measured groundwater elevation at the site was approximately +1.5 feet msl during this investigation (See Section 3.3). The conceptual plans indicate a basement foundation elevation on the order of +1 feet msl, and a few feet deeper for the elevator shaft. To accommodate potential future increases in the ground water elevation due to changes in local rainfall or nearby irrigation practices, we recommend that a design ground water elevation of +6 feet msl be utilized in project design. In connection with construction dewatering, we raise the following cautionary issues:

- The phreatic surface (top of the depressed ground water mound) during excavation and construction must at all times be below the bottoms of the deepest excavations (minimum 4 feet) for foundations so as to prevent loosening of the undisturbed soils by upward flow of water (boiling). The phreatic surface must remain below such excavations until adequate building loads have been placed on the bottom of the excavation. Backup power systems should be considered for the pumps.
- Depending on the hydraulic characteristics and geology of the site and nearby areas, the extent of ground water table lowering (cone of depression) due to the construction dewatering system could have a radius of influence which reaches off-site. Therefore, it should be noted that some minor settlement of the ground surface within the cone of depression should be expected in areas underlain by loose to medium dense sands or soft clays. We recommend that as a minimum, crack surveys be performed and settlement monuments be installed and monitored on structures or improvements near the site. This information may also be useful in defending unfounded claims of distress to adjacent site improvements.
- We recommend that the dewatering contractor be responsible for designing, installing, and operating a dewatering system capable of lowering and maintaining the ground water table at the desired depths during construction. The information provided in this report may not be sufficient for a complete design of a construction dewatering system.

7.6 Construction Observation and Plan Reviews

The recommendations provided in this report are based on preliminary design information and subsurface conditions disclosed by widely spaced borings. The interpolated subsurface conditions should be checked in the field during construction. Construction



observation of all onsite excavations and field density testing of all compacted fill should be performed by a representative of this office so that construction is in accordance with the recommendations of this report. We recommend that where possible, excavation exposures be geologically mapped by the geotechnical consultant during grading for the presence of potentially adverse geologic conditions. In addition, during the installation of perimeter shoring systems, we also recommend that a geologist be on-site to log sidewalls for potential faults, since the City will require an "as-built" letter regarding existing fault hazards prior to the approval of building permit inspection services.

Final project drawings should be checked by Leighton and Associates, Inc. before excavation to see that the recommendations provided in this report are incorporated in the project plans.



8.0 LIMITATIONS

The conclusions and recommendations presented in this report are based in part upon data that were obtained from a limited number of observations, site visits, excavations, samples, and tests. Such information is by necessity incomplete. The nature of many sites is such that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report can be relied upon only if Leighton has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to confirm that our preliminary findings are representative for the site.

An information sheet prepared by ASFE (the Association of Engineering Firms Practicing in the Geosciences) is also included as Appendix F. We recommend that all individuals utilizing this report read the limitations along with the attached document.



Figures



**Bayside Fire Station
Cedar and Pacific Highway
San Diego, California**

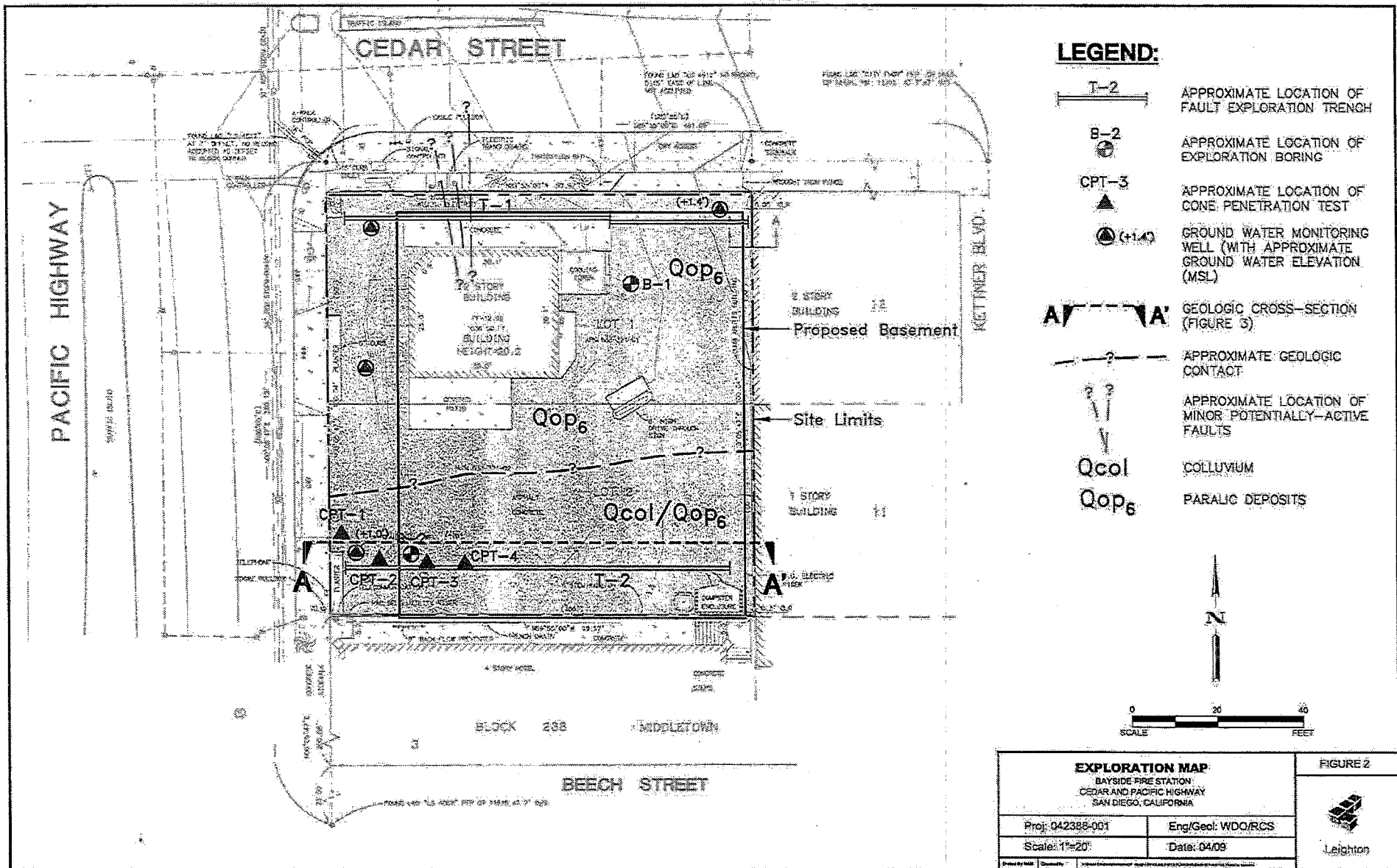
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MAP**

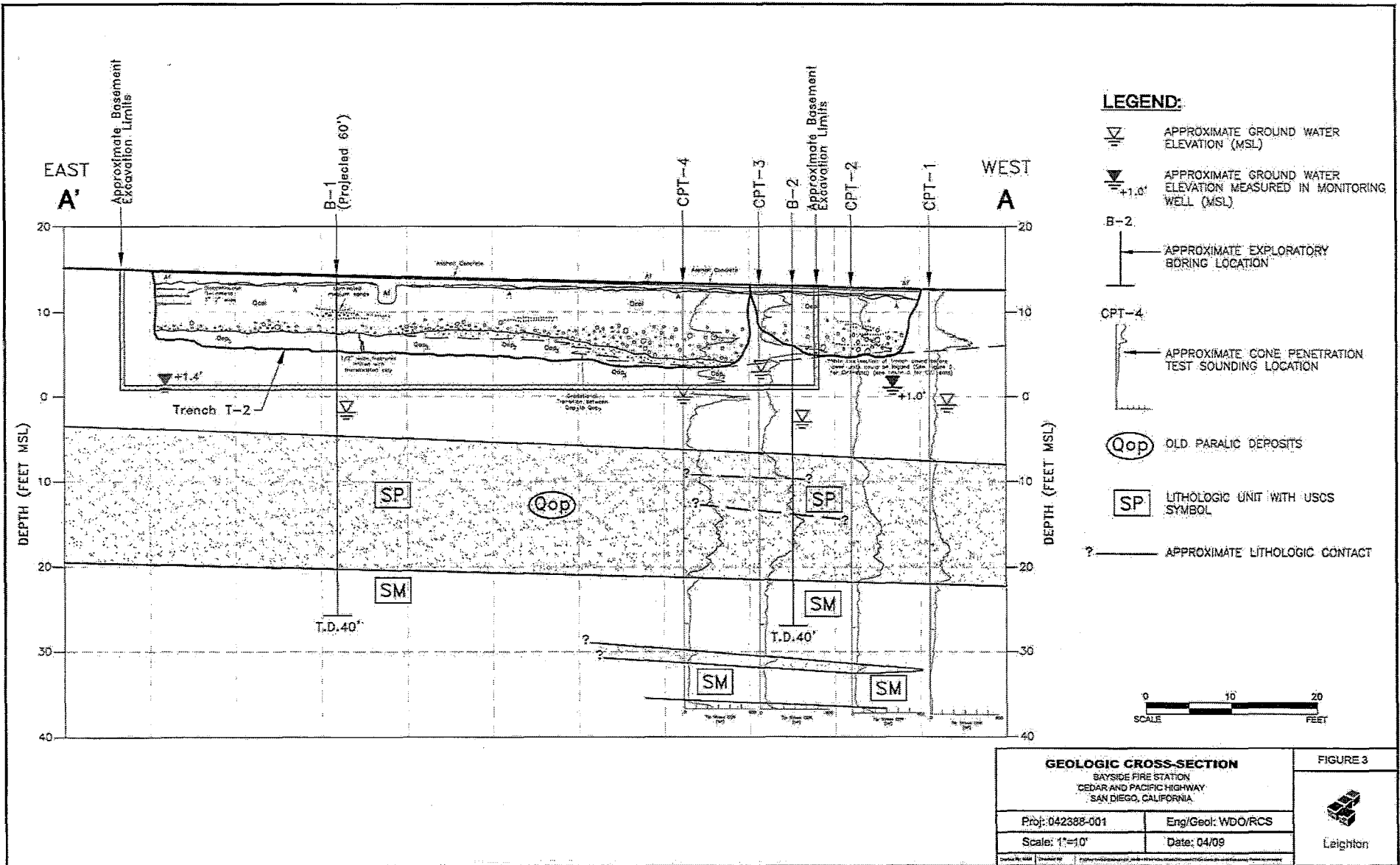
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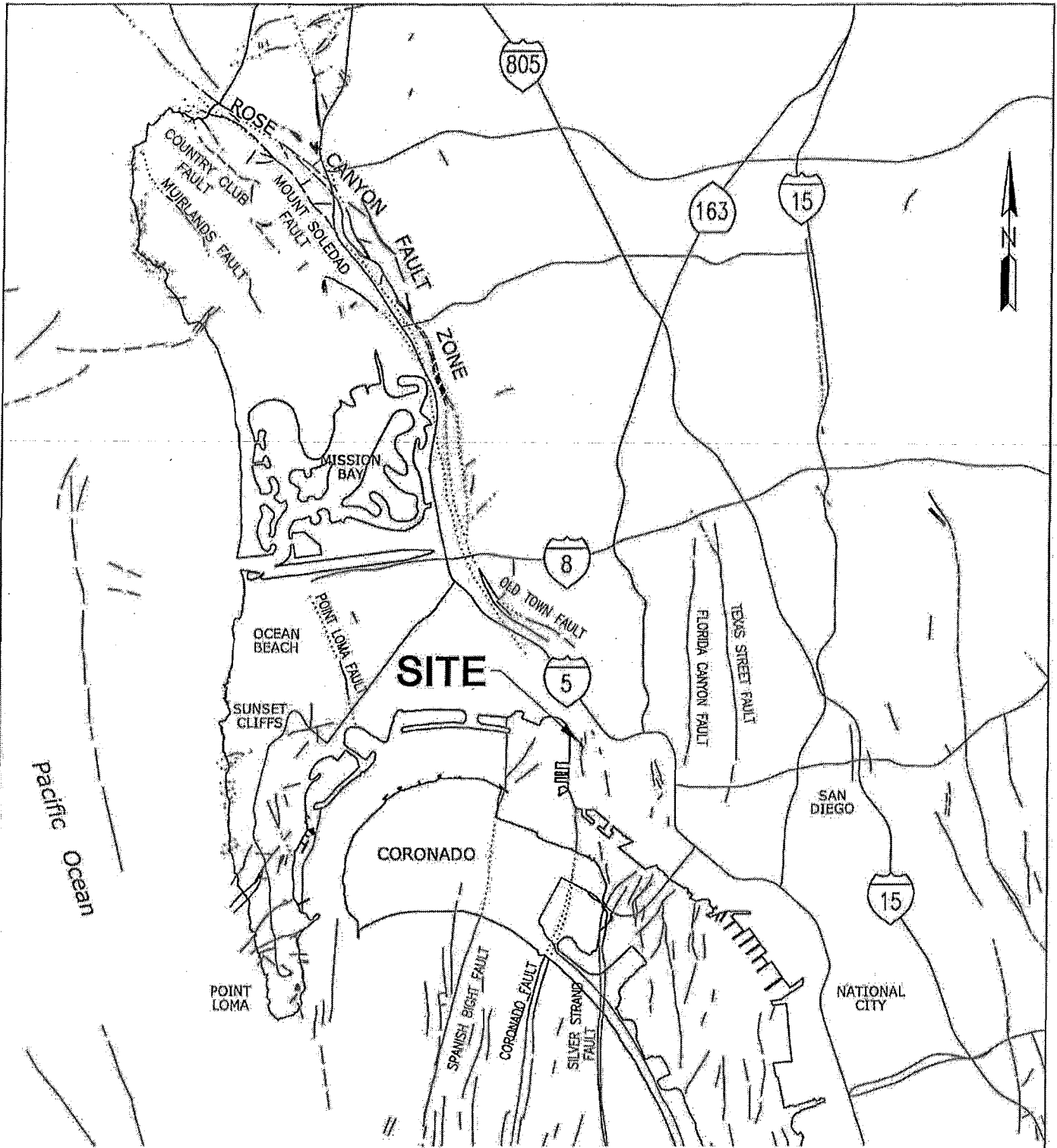
Date
April 2009



Figure 1







MODIFIED FROM: TREIMAN, J.A., 1993; CITY OF SAN DIEGO SEISMIC STUDY, 1995; KENNEDY, M.P. AND CLARKE, S.H., 1999.

Figure 4

ROSE CANYON FAULT MAP
 BAYSIDE FIRE STATION
 SAN DIEGO, CALIFORNIA

Proj: 042388-001

Date: 04/2009

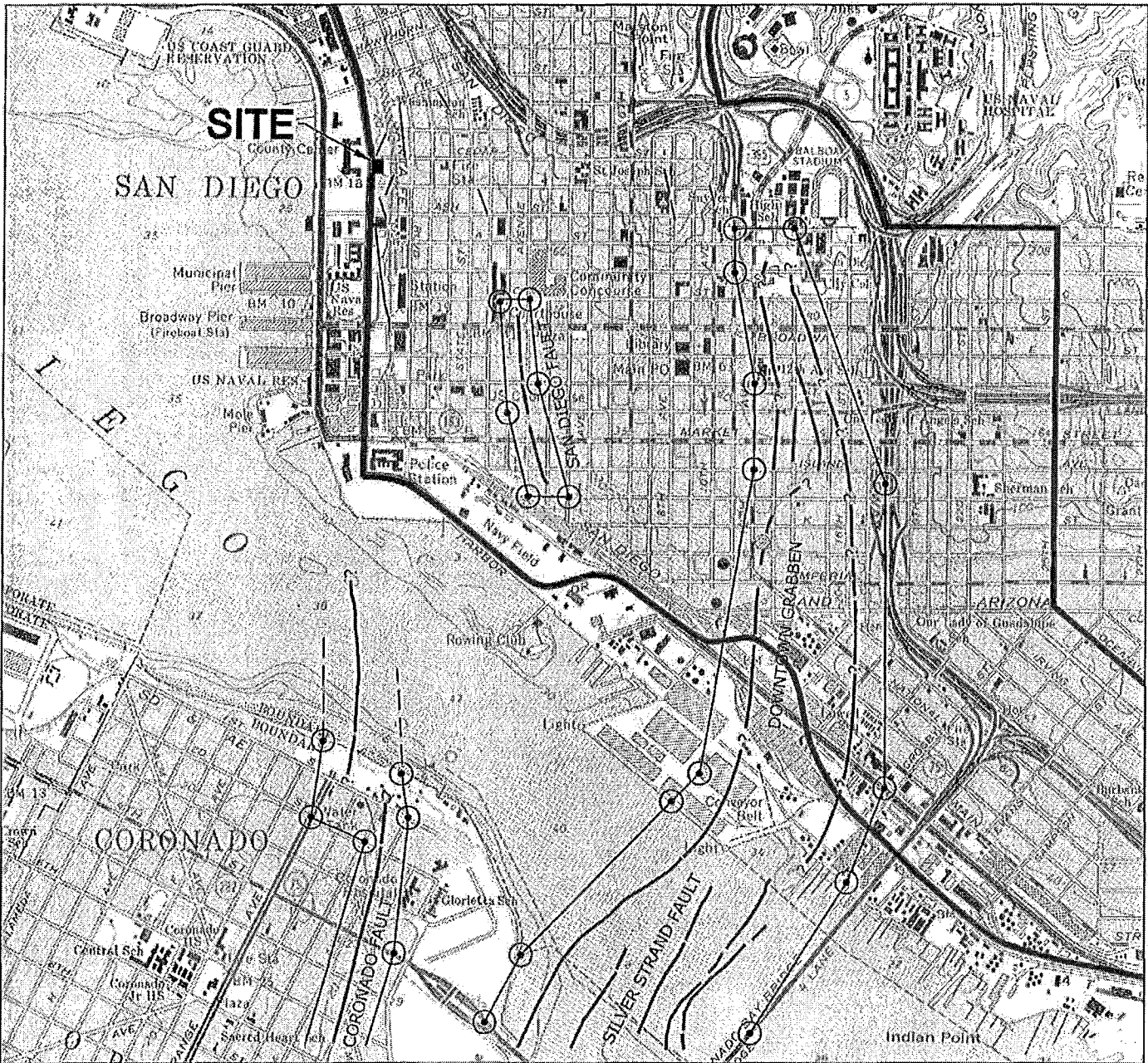
Eng/Geol: WDO/RCS

Scale: 1" = 10,000'






Leighton

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REFERENCE: CALIFORNIA GEOLOGIC SURVEY (CGS), 2003

LEGEND:

-  EARTHQUAKE FAULT ZONE BOUNDARIES WITH ACTIVE FAULTS (IN BROWN)
-  POTENTIALLY ACTIVE FAULT LOCATIONS
-  CITY SPECIAL STUDY ZONE

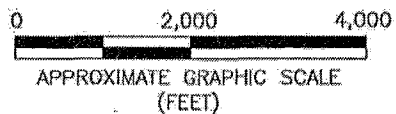
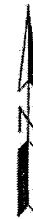


Figure 5

SAN DIEGO METROPOLITAN EARTHQUAKE FAULT ZONE MAP
 BAYSIDE FIRE STATION
 SAN DIEGO, CALIFORNIA

Proj: 042388-001

Date: 04/2009

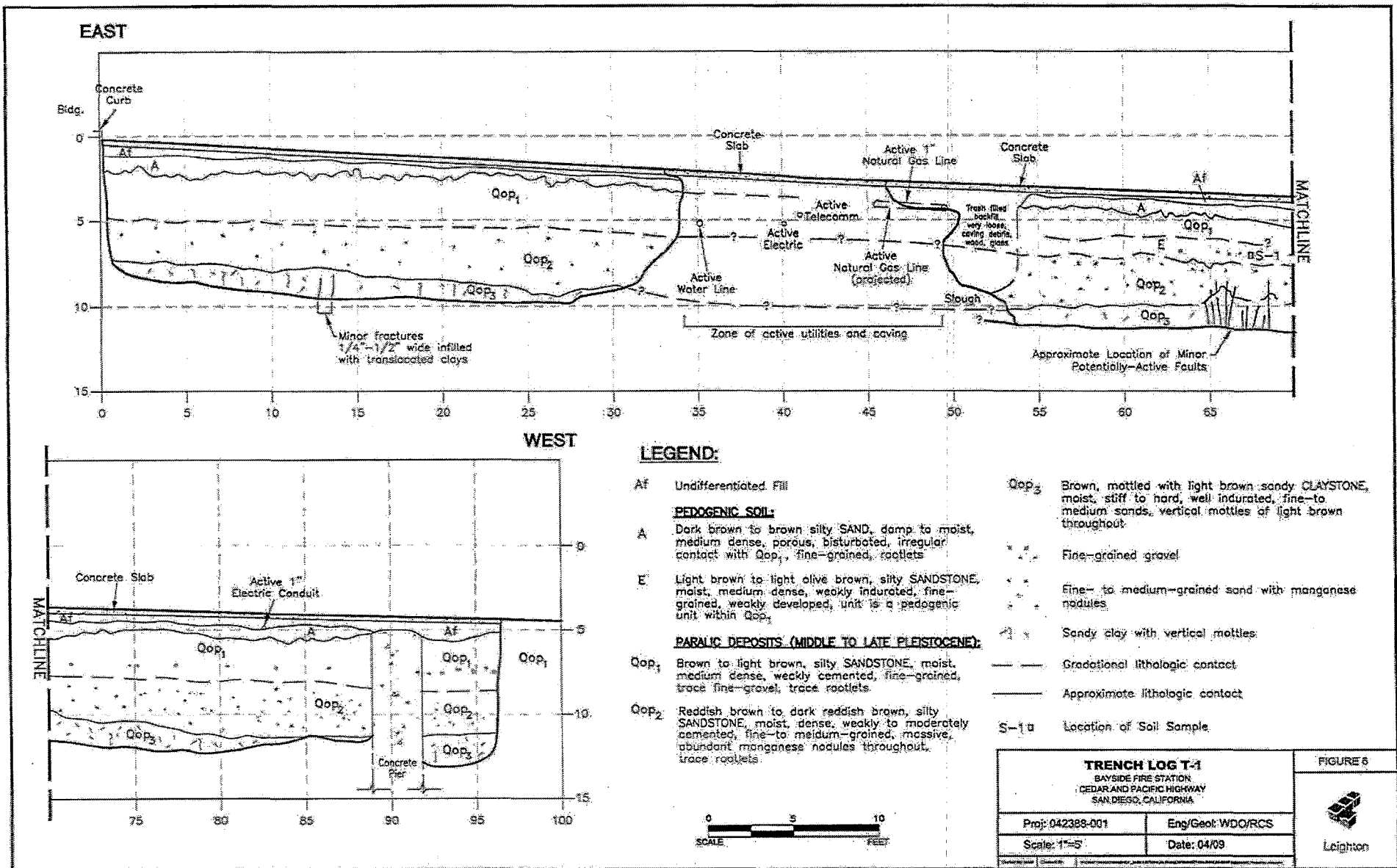
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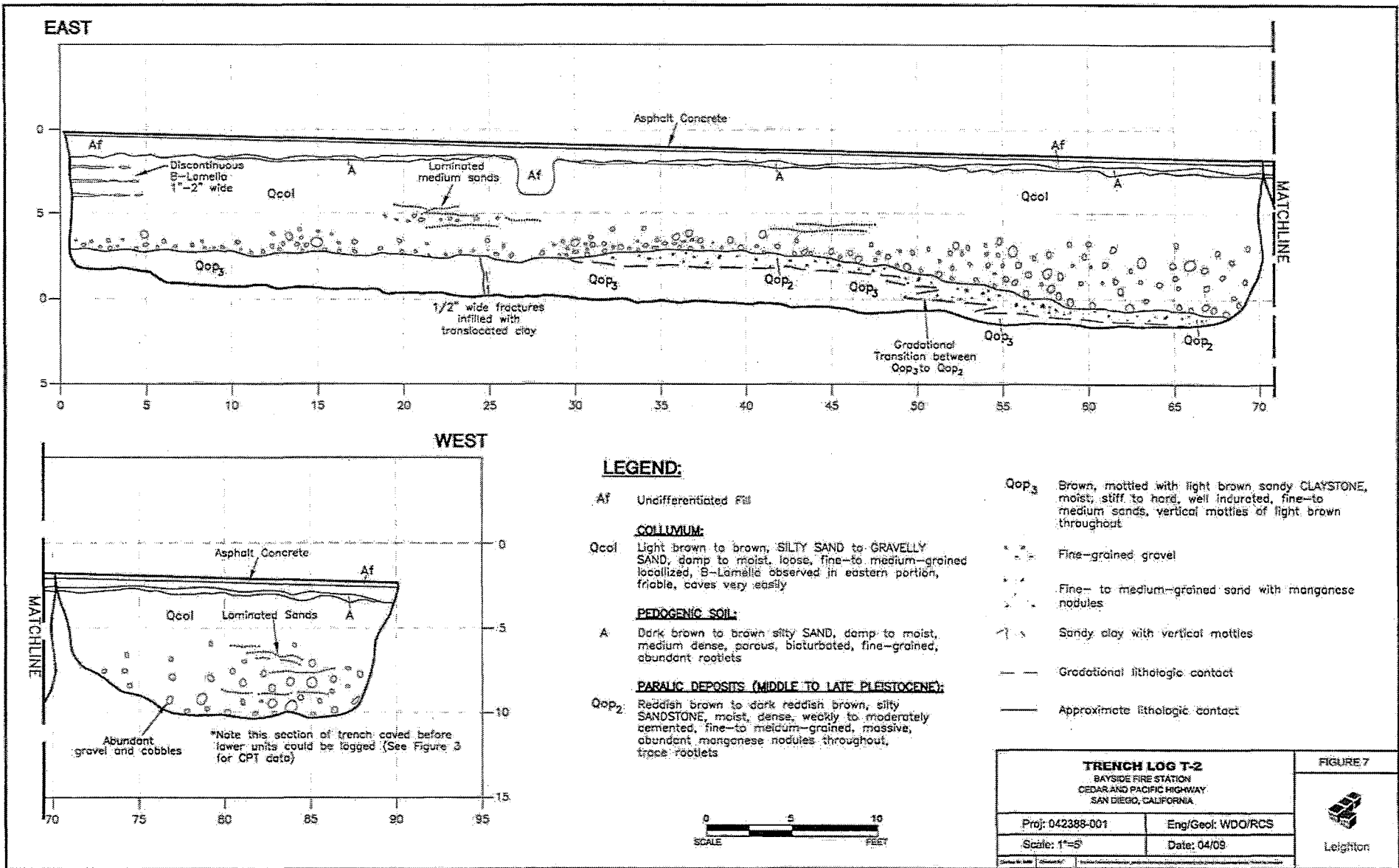
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Leighton





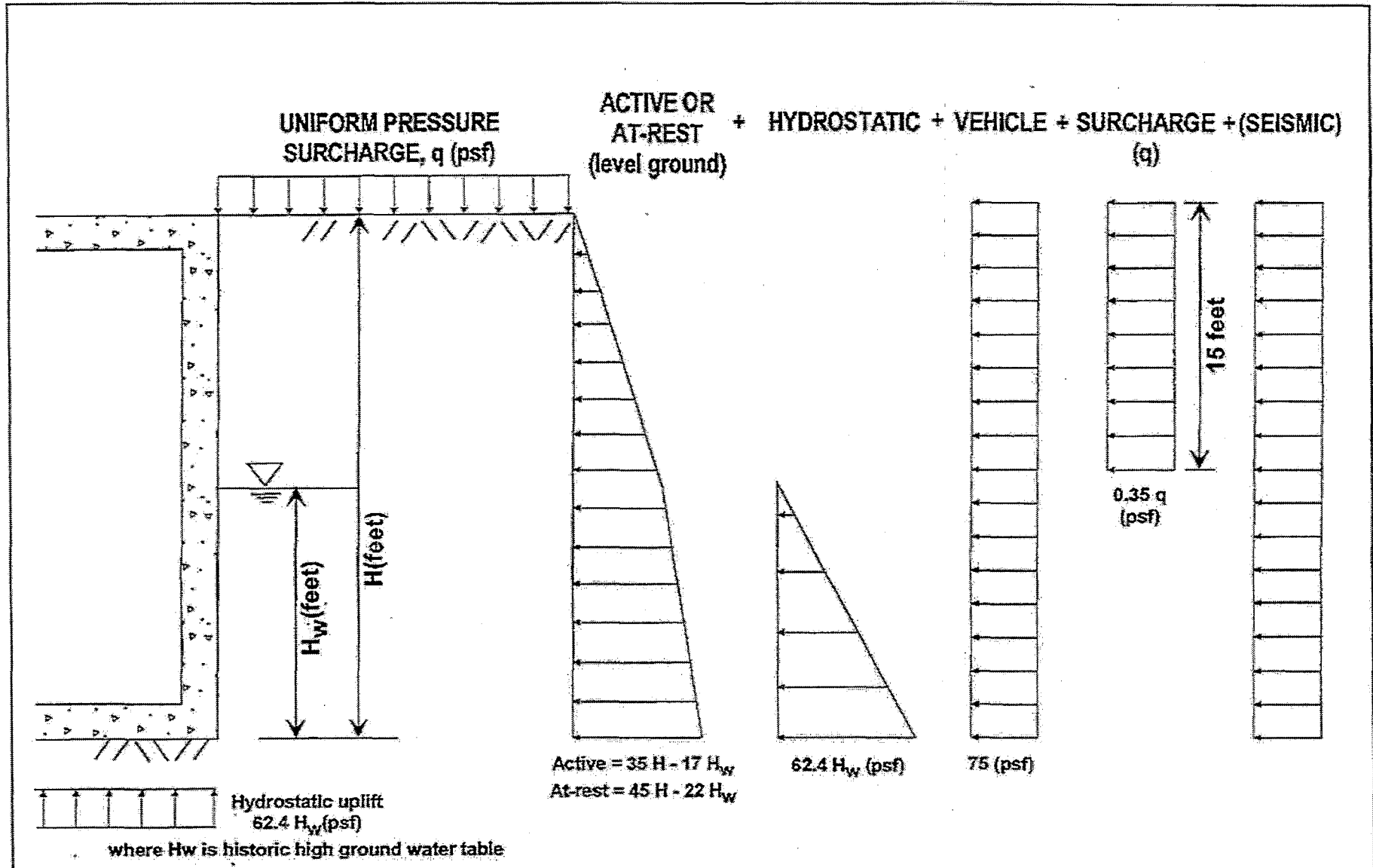


Figure 8

LATERAL EARTH AND HYDROSTATIC PRESSURES
MOTION RESPONSE SPECTRUM
BAYSIDE FIRE STATION
SAN DIEGO, CALIFORNIA



Leighton

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Scale: NTS

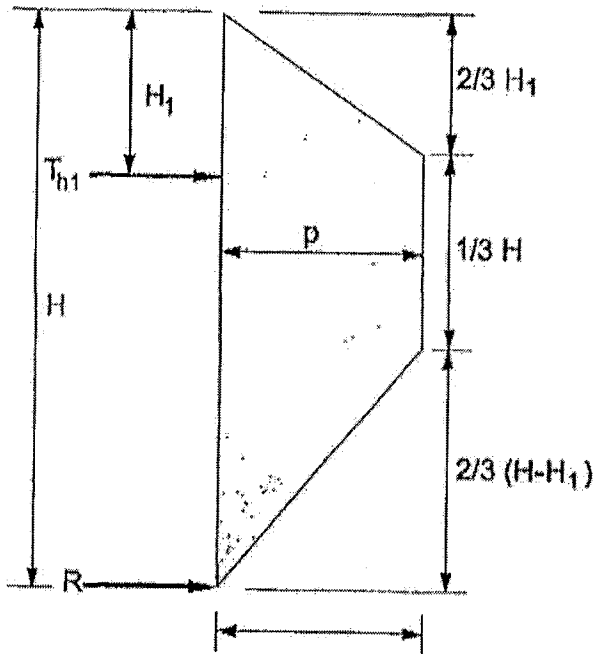
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Eng./Geol. WDO/RCS

Drafted By:

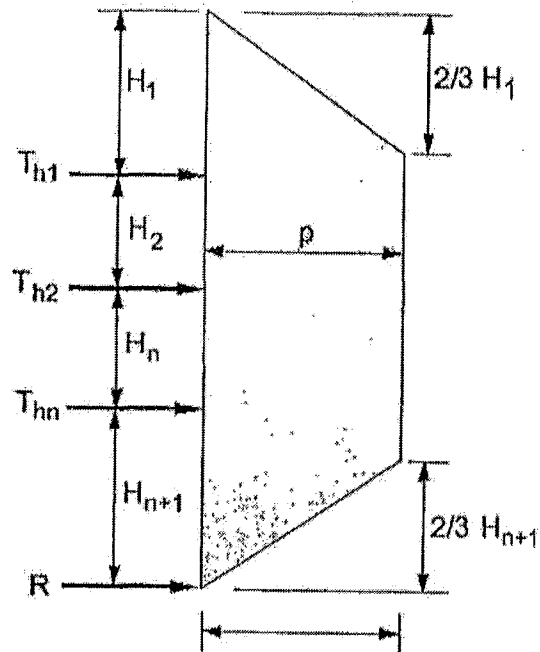
CP By:

P:\DRAFTING\042388\001\OF_09-02-13\FIGURES 8&9.DWG (04-03-09 8:50:17AM) Plotted by: mmurphy



$$p = \frac{\text{TOTAL LOAD}}{2/3 H} \approx K_A \gamma H$$

(a) Walls with one level of ground anchors



$$p = \frac{\text{TOTAL LOAD}}{H - 1/3 H_1 - 1/3 H_{n+1}}$$

(b) Walls with multiple levels of ground anchors

H_1 = Distance from ground surface to uppermost ground anchor

H_{n+1} = Distance from base of excavation to lowermost ground anchor

T_{hi} = Horizontal load in ground anchor i

R = Reaction force to be resisted by subgrade (i.e., below base of excavation)

p = Maximum ordinate of diagram

Figure 9

ALTERNATIVE SHORING PRESSURES

BAYSIDE FIRE STATION
SAN DIEGO, CALIFORNIA

Proj: 042388-001

Date: 04/2009

Eng/Geol: WDO/RCS

Scale: NTS

P:\DRAFTING\042388\DWG_09-02-15\FIGURE 8 AND 9.DWG (01-03-09 8:51:38AM) Plotted by: rcmunphy



Leighton

Appendix A

References

APPENDIX A

REFERENCES

- Abrahamson, N.A. and Silva, W.J., 1997, Empirical Response Spectral Attenuation Relations for Shallow Coastal Earthquakes, *Seismological Research Letters*, Vol. 68, No. 1 January/February, 1997.
- CDMG, 1997, Fault Rupture Hazard Zones in California, Special Publication No. 42; Revised 1997.
- _____, 1991, Special Studies Zone, Point Loma Quadrangle, dated November 1, 1991, revised 2003.
- _____, 1996a, Guidelines for Evaluating the Hazard of Surface Fault Rupture: Adopted by the Board on May 9, 1996, 6p.
- _____, 1996b, Probabilistic Seismic Hazard Assessment for the State of California, Open-File Report, 96-08.
- City of San Diego, 1999, "Active", "Potentially Active" and "Inactive" Faults – Defined, Memorandum, dated May 20.
- City of San Diego, 1995, Seismic Safety Study, Sheet 17.
- City of San Diego, 1954, Metropolitan topographic survey, 1"=200', Sheet 202-1713 and 198-1713, edition of 1954.
- California Building Standards Commission (CBSC), 2007, California Building Code, Volumes 1 and 2.
- City of San Diego, Building Inspection Department, 1998, Building Code Amendments.
- DeMets, C., Gordon, R.G., Argus, D.F., and Stein, S., 1990, Current plate motions: *Geophysics Journal International*, Vol. 101, pp. 425-478.
- EERI, 2000, Sixth International Conference on Seismic Zonation, Effects of Rupture Directivity on Probabilistic Seismic Hazard Analysis, by Abrahamson, N.A., 2000.
- Fairbanks, H.W., 1893, Geology of the San Diego County; also portions of the Orange and San Bernardino Counties: California Mining Bureau 11th Annual Report, pp. 76-120.
- Hart, E.W., 1997, Fault Rupture Hazard Zones in California: Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zone Maps: California Division of Mines and Geology Special Publication 42 (Revised 1997, Supplements 1 and 2 added 1999).
- International Conference of Building Officials, 1997, Uniform Building Code.

APPENDIX A

REFERENCES (Continued)

- Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Division of Mines and Geology, California Geologic Map Series, Map No. 6
- Kennedy, M.P. and Tan, S.S., 2005, Geologic Map of the San Diego 30' X 60' Quadrangle, California Compiled by Michael P. Digital Preparation by Kelly R. Bovard, Anne G. Garcia and Diane Burns, California Geological Survey.
- Kennedy, M.P., 1975, Geology of the Western San Diego Metropolitan Area, California; Del Mar, La Jolla, and Point Loma 7-1/2 Minute Quadrangles; in Geology of the San Diego Metropolitan Area, California: California Division of Mines and Geology Bulletin #200, pp. 9-39.
- Kennedy, M.P. and Clarke, S.H., 1999, Analysis of Late Quaternary Faulting in San Diego Bay and Hazards to the Coronado Bridge: California Division of Mines and Geology, Open File Report 97-10A.
- Kennedy, M.P. and Clarke, S.H., 1999, Age of Faulting in San Diego Bay in the Vicinity of the Coronado Bridge – An Addendum to - Analysis of Late Quaternary Faulting in San Diego Bay and Hazards to the Coronado Bridge: California Division of Mines and Geology, Open File Report 97-10B.
- Kennedy, M.P., and Welday, E.E., 1980, Recency and Character of Faulting Offshore Metropolitan San Diego, California. California Division of Mines and Geology, Map Sheet 40.
- Kern, J.P. 1973, Origin and History of Upper Pleistocene Marine Terraces, San Diego, California, GSA Bulletin: Vol. 88.
- _____, 1988, Preliminary-Earthquake Shaking and Fault Rupture in San Diego County: A Report to the San Diego Earthquake Preparedness Committee, 58p.
- Kern and Rockwell, 1992, Chronology and Deformation of Quaternary Marine Shorelines, San Diego County, California, SEPM Special Publication No. 48.
- Legg, M. R., 1985, Geologic structure and tectonics of the inner continental borderland offshore northern Baja California, Mexico: unpublished Ph.D. dissertation, University of California, Santa Barbara.
- Leighton and Associates, 2007, Fault Hazard Study, Imperial Avenue Marketplace Redevelopment Project, Imperial Avenue and Commercial Street, Between 20th and 23rd Streets, San Diego, California, Project No. 042274-001, dated December 26, 2007.
- Lindvall, S. and Rockwell, T.K., 1995, Holocene Activity of the Rose Canyon Fault, San Diego, California: Journal of Geophysical Research, Vol. 100, No. B12, pp. 24121-24132.
- Rockwell, Thomas K., Lindvall, Scott C., Haraden, Colleen C., Hirabayashi, C. Kenji, and Baker, Elizabeth, 1991, Minimum Holocene Slip Rate for the Rose Canyon Fault in San Diego, California: in (Abbott, P.L., ed.) Environmental Perils, San Diego Region: for the Annual Meeting of the Geological Society of America, San Diego Association of Geologists, pp. 37-46.

APPENDIX A

REFERENCES (Continued)

- Savage, J.C., Prescott, W.H., Lisowski, M., and King, N., 1979, Deformation across the Salton Trough, California, 1973-1977: *Journal of Geophysical Research*, Vol. 84, no. B6, pp. 3069-3079.
- Somerville, et. al. 1997, Modification of Empirical Strong Ground Motion Attenuation Relations to Include the Amplitude and Duration Effects of Rupture Directivity, *Seismological Research Letters*, Vol. 68, No. 1, January/February 1997.
- Tokimatsu, K., and Seed, H.B., 1987, Evaluation of Settlements in Sands Due to Earthquake Shaking, *ASCE Journal of Geotechnical Engineering*, Vol. 113, No. 8 dated August 1987.
- Treiman, J.A., 1993, The Rose Canyon Fault Zone, Southern California: California Division of Mines and Geology, Open File Report 93-02, 45p.
- Treiman, J.A., 2000, Silver Strand Fault, Coronado Fault, Spanish Bight Fault, San Diego Fault and Downtown Graben, Southern Rose Canyon Fault Zone, San Diego, California, California Division of Mines and Geology, Unpublished Fault Evaluation Report FEER-245.
- United States Department of Agriculture, 1953, Aerial Photographs, Flight AXN-3M, Numbers 196 and 197, scale approximately 1:24,000, dated March 31.
- URS, 2006, Fault Investigation for the Monarch School, San Diego, California, dated September 6.
- Youd, T.L., Hanson C.M., and Bartlett, S.F., 1999, Revised MLR Equations for Predicting Lateral Spread Displacement, Proceedings of the 7th U.S.-Japan Workshop on Earthquake.

Appendix B
Boring and CPT Logs

GEOTECHNICAL BORING LOG KEY

Date _____ Sheet 1 of 1
 Project KEY TO BORING LOG GRAPHICS Project No. _____
 Drilling Co. _____ Type of Rig _____
 Hole Diameter _____ Drive Weight _____ Drop _____
 Elevation Top of Elevation ' _____ Location _____

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per Foot	Dry Density pct	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
		N S							Asphaltic concrete	
									Portland cement concrete	
								CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay	
							CH			
							OL			
	5							ML	Inorganic silt; clayey silt with low plasticity	
								MH	Inorganic silt; diatomaceous fine sandy or silty soils; elastic silt	
								ML-CL	Clayey silt to silty clay	
								GW	Well-graded gravel; gravel-sand mixture, little or no fines	
								GP	Poorly graded gravel; gravel-sand mixture, little or no fines	
	10							GM		
								GC	Clayey gravel; gravel-sand-clay mixture	
								SW	Well-graded sand; gravelly sand, little or no fines	
								SP	Poorly graded sand; gravelly sand, little or no fines	
								SM	Silty sand; poorly graded sand-silt mixture	
	15							SC		
									Bedrock	
									Ground water encountered at time of drilling	
	20			B-1					Bulk Sample	
				C-1					Core Sample	
				G-1					Grab Sample	
				R-1					Modified California Sampler (3" O.D., 2.5 I.D.)	
				SH-1					Shelby Tube Sampler (3" O.D.)	
				S-1					Standard Penetration Test SPT (Sampler (2" O.D., 1.4" I.D.))	
	25									
	30									

SAMPLE TYPES: S SPLIT SPOON R RING SAMPLE B BULK SAMPLE T TUBE SAMPLE	G GRAB SAMPLE SH SHELBY TUBE	TYPE OF TESTS: DS DIRECT SHEAR MD MAXIMUM DENSITY GN CONSOLIDATION CR CORROSION SA SIEVE ANALYSIS AT ATTERBURG LIMITS EI EXPANSION INDEX RV R-VALUE
--	---------------------------------	--



LEIGHTON

GEOTECHNICAL BORING LOG B-1

Project No. 042388-001
 Project Bayside Fire Station, San Diego, CA
 Drilling Co. Tri-County Drilling
 Drilling Method Deidrich 120 - 140 lb, Autohammer, drop 30"
 Location Northeast Corner

Date Drilled 2-3-09
 Logged By RCS
 Hole Diameter 8"
 Ground Elevation 14'
 Sampled By RCS

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 inches	Dry Density pcf	Moisture Content, %	Soil Class (U.S.C.S.)	SOIL DESCRIPTION		Type of Tests
									<i>The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.</i>		
0	0							SM	ASPHALT CONCRETE: 2-1/2" thick underlain by 6" light brown clayey SAND PARALIC DEPOSITS: Reddish brown silty SANDSTONE, moist, medium dense, fine-grained		
10	5			R-1	17 15 20	111.0	13.0	SM	Mottled with brown and gray, slight odor	DS	
15	12-17			B-1							
15	12-17			S-1	5 10 17			SM	Olive to gray-brown, odorous		
20	20			R-2	10 15 21	104.0	22.0	SP	Gray to olive-gray, SANDSTONE, saturated, medium dense, fine- to medium-grained, localized black zones, slight odor	SA	
25	25			S-2	3 9 17				Brown to light reddish brown, micaceous		
30	30										

SAMPLE TYPES:
 S SPLIT SPOON G GRAB SAMPLE
 R RING SAMPLE C CORE SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:
 DS DIRECT SHEAR SA SIEVE ANALYSIS -200 % FINES PASSING
 MD MAXIMUM DENSITY SE SAND EQUIVALENT AL ATTERBERG LIMITS
 CN CONSOLIDATION EI EXPANSION INDEX CO COLLAPSE
 CR CORROSION RV R VALUE PP POCKET PENETROMETER



*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG B-1

Project No.	042388-001	Date Drilled	2-3-09
Project	Bayside Fire Station, San Diego, CA	Logged By	RCS
Drilling Co.	Tri-County Drilling	Hole Diameter	8"
Drilling Method	Deidrich 120 - 140 lb, Autohammer, drop 30"	Ground Elevation	14'
Location	Northeast Corner	Sampled By	RCS

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
30		•••••		R-3	13 21 33	97.0	25.0	SP	Reddish brown, SANDSTONE, saturated, dense, fine- to medium-grained, micaceous	
-20		•••••		S-3	9 7 11			SM	Reddish brown, silty clayey SANDSTONE, saturated, medium dense to dense, micaceous, fine- to medium-grained	
-25		•••••		S-4	8 13 13				Fine-grained, dense, micaceous	
-30		•••••							Total Depth = 41.5 Ground water at approximately 16 feet below ground surface Backfilled with bentonite grout and patched on 2/3/09	
-35		•••••								
-40		•••••								
-45		•••••								
60		•••••								

SAMPLE TYPES:		TYPE OF TESTS:			
S SPLIT SPOON	G GRAB SAMPLE	DS DIRECT SHEAR	SA SIEVE ANALYSIS	-200 % FINES PASSING	
R RING SAMPLE	C CORE SAMPLE	MD MAXIMUM DENSITY	SE SAND EQUIVALENT	AL ATTERBERG LIMITS	
B BULK SAMPLE		CN CONSOLIDATION	EI EXPANSION INDEX	CO COLLAPSE	
T TUBE SAMPLE		CR CORROSION	RV R VALUE	PP POCKET PENETROMETER	



GEOTECHNICAL BORING LOG B-2

Project No. 042388-001
 Project Bayside Fire Station, San Diego, CA
 Drilling Co. Tri-County Drilling
 Drilling Method Deldrich 120 - 140 lb, Autohammer, drop 30"
 Location Southwest Corner

Date Drilled 2-3-09
 Logged By RCS
 Hole Diameter 8"
 Ground Elevation 12'
 Sampled By RCS

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 inches	Dry Density pcf	Moisture Content, %	Soil Class (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
0	0							SM	ASPHALT CONCRETE: 2" thick underlain by 5" light brown clayey SAND	
10	10							GM	COLLUVIUM: Dark brown silty SAND, moist, loose to medium dense, trace gravel, fine-grained	
5	5							GM	5'-8' abundant gravel, trace cobble; lag deposit	
10	10			R-1 B-1 10'-15'	9 17 44	115.0	16.0	SM	PARALIC DEPOSITS: Brown to reddish brown, silty SANDSTONE, moist, medium dense, fine- to medium-grained, trace pinhole porosity	CR
15	15			S-1	7 9 24			SC	Dense, increase in clay content	
20	20				4 8 10			SP	No recovery, medium dense	
25	25			S-2	7 12 14				Gray to olive-gray, SANDSTONE, saturated, dense, fine- to medium-grained Trace gravel with broken shells	
30	30									

SAMPLE TYPES:
 S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
 DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

SA SIEVE ANALYSIS
SE SAND EQUIVALENT
EI EXPANSION INDEX
RV R VALUE

-200 % FINES PASSING
AL ATTERBERG LIMITS
CO COLLAPSE
PP POCKET PENETROMETER



*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG B-2

Project No.	042388-001	Date Drilled	2-3-09
Project	Bayside Fire Station, San Diego, CA	Logged By	RCS
Drilling Co.	Tri-County Drilling	Hole Diameter	8"
Drilling Method	Deidrich 120 - 140 lb, Autohammer, drop 30"	Ground Elevation	12'
Location	Southwest Corner	Sampled By	RCS

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30	N S		R-2	13 20 25	97.0	27.0	SP	Fine-grained	SA
	-20			S-3	11 10 11			SM	Reddish brown, silty clayey SANDSTONE, saturated, medium dense to dense, fine- to medium-grained dense	
	-25			S-4	8 20 22					
	-30								Total Depth = 41.5 Feet Ground water at approximately 16 feet below ground surface Backfilled with bentonite grout and patched on 2/3/09	
	-40									
	-45									
	-50									
	-55									
	-60									

SAMPLE TYPES: S SPLIT SPOON G GRAB SAMPLE R RING SAMPLE C CORE SAMPLE B BULK SAMPLE T TUBE SAMPLE	TYPE OF TESTS: DS DIRECT SHEAR SA SIEVE ANALYSIS -200 % FINES PASSING MD MAXIMUM DENSITY SE SAND EQUIVALENT AL ATTERBERG LIMITS CN CONSOLIDATION EI EXPANSION INDEX CD COLLAPSE CR CORROSION RV R VALUE PP POCKET PENETROMETER
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*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

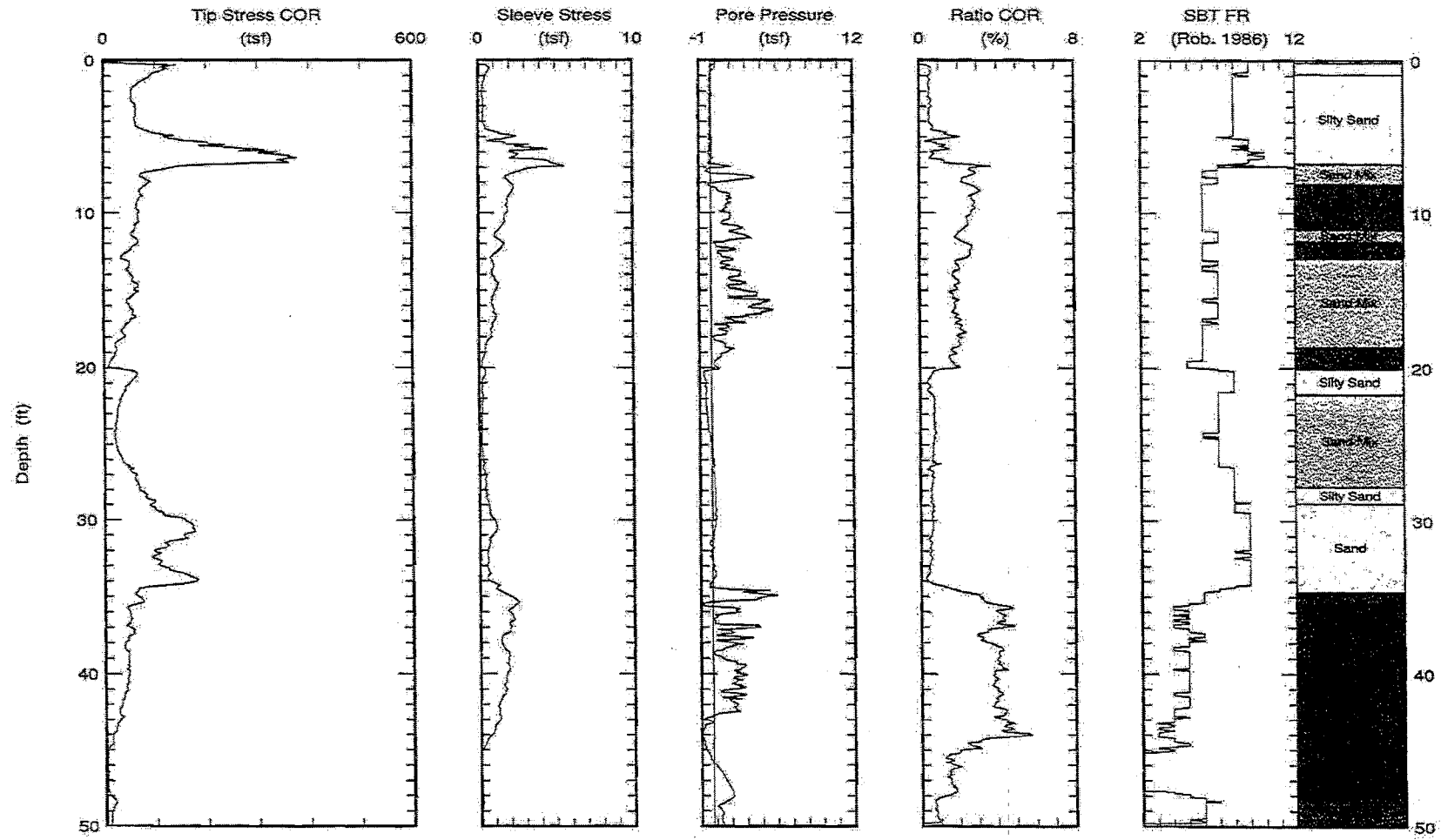


Kehoe Testing & Engineering
 Office: (714) 901-7270
 Fax: (714) 901-7289
 rich@kehoetesting.com
 skehoe@msn.com


CPT Data
 30-ton rig

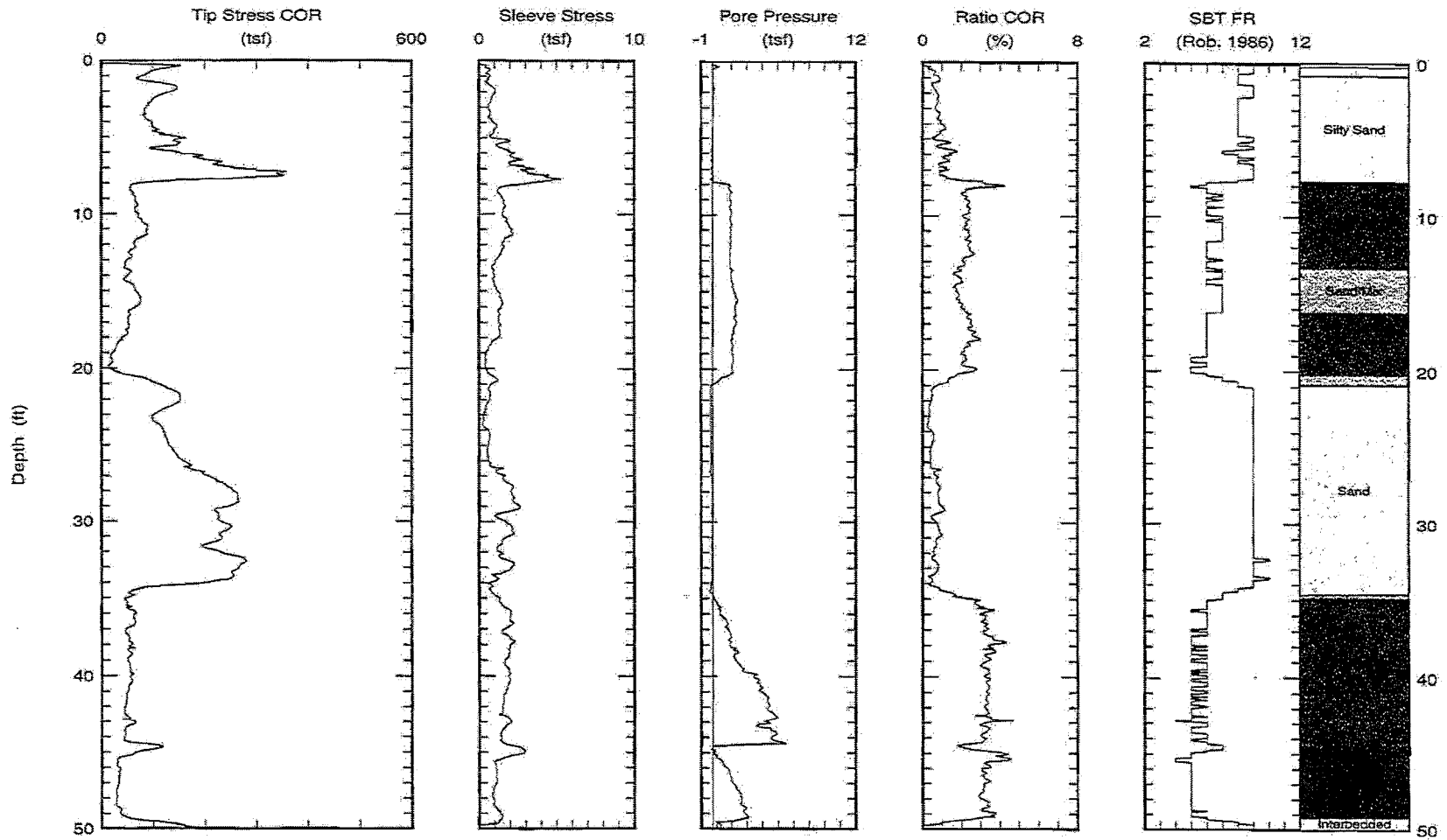
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 Test ID: CPT-1
 Project: San Diego

Customer: Leighton & Assoc.
 Job Site: Pacific Hwy & W Cedar St




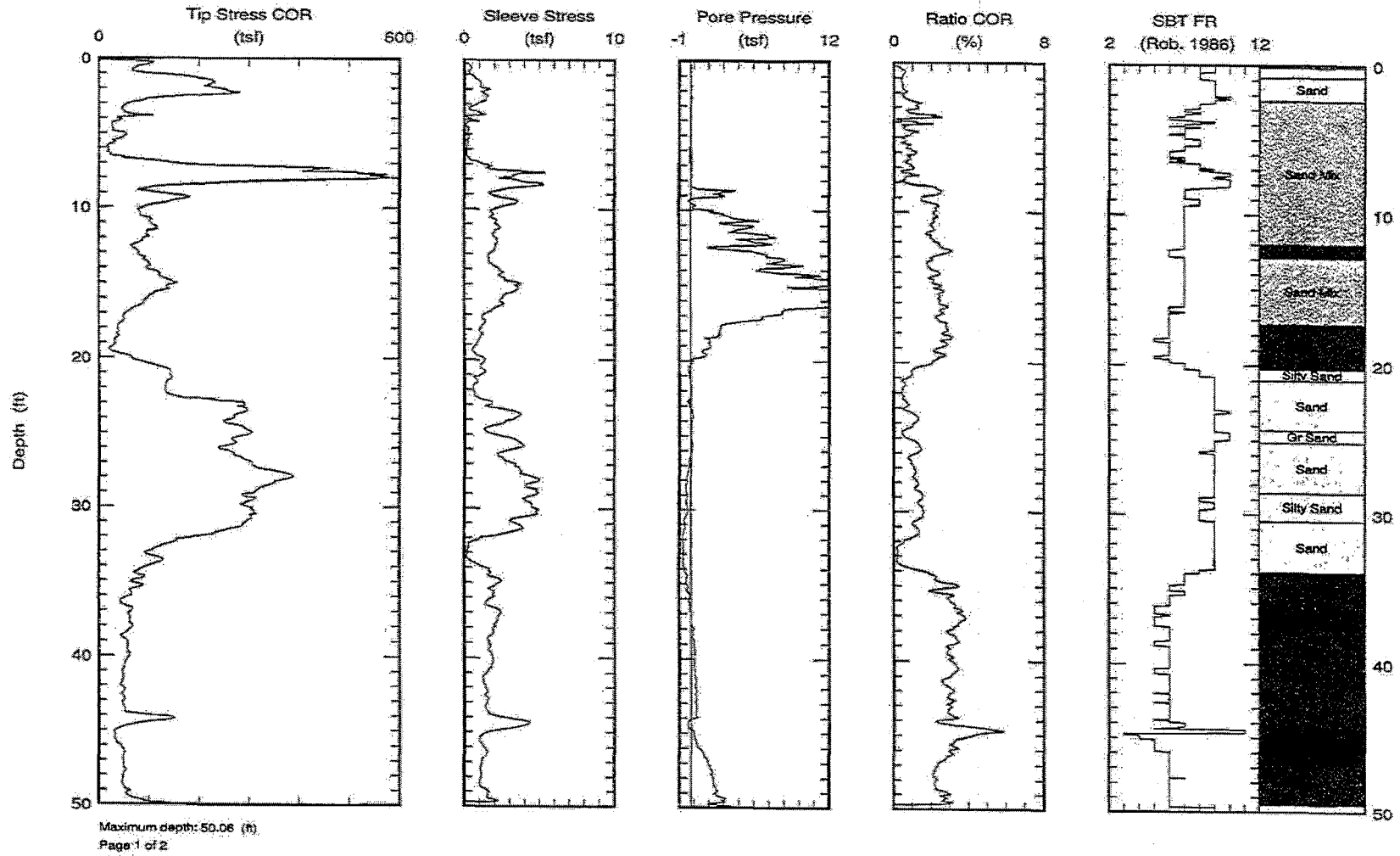
Maximum depth: 50.08 (ft)
 Page 1 of 2


 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com skehoe@msn.com	CPT Data 30 ton rig	Date: 16/Mar/2009 Test ID: CPT-2 Project: San Diego
	Customer: Leighton & Assoc. Job Site: Pacific Hwy & W Cedar St.	

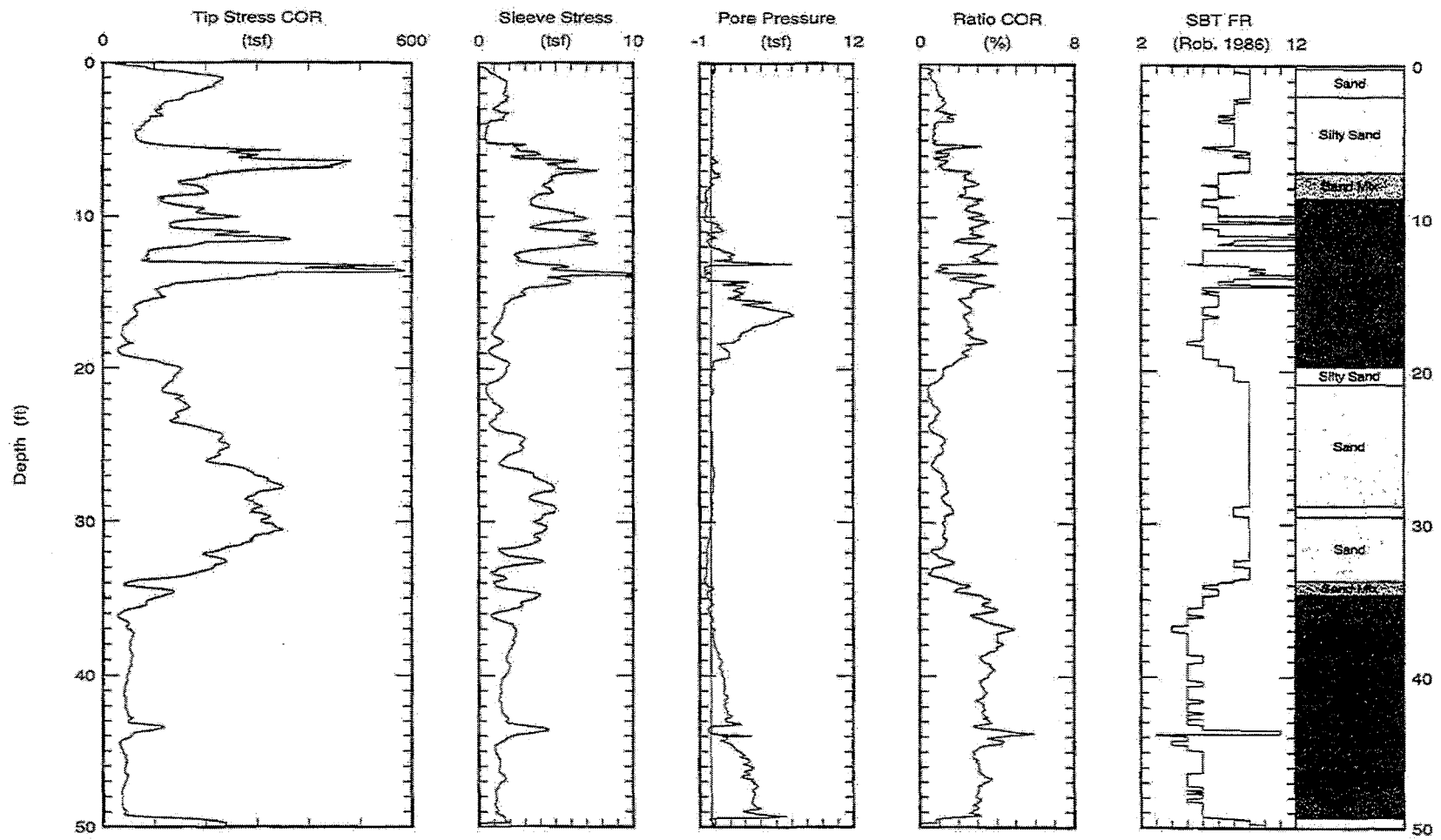


Maximum depth: 50.06 (ft)
 Page 1 of 2

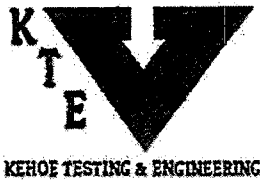
 K T E	Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com skehoe@msn.com	CPT Data 30 ton rig	Date: 16/Mar/2009 Test ID: CPT-3 Project: San Diego
	Customer: Leighton & Assoc. Job Site: Pacific Hwy & W Cedar St		



 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com skehoe@msn.com	CPT Data 30 ton rig	Date: 16/Mar/2009 Test ID: CPT-4 Project: San Diego
	Customer: Leighton & Assoc. Job Site: Pacific Hwy & W Cedar St	

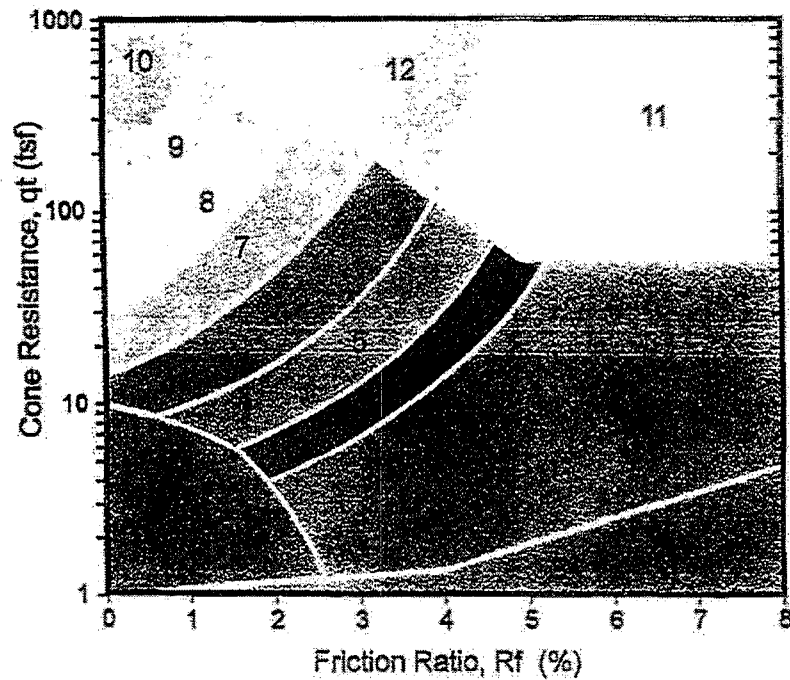


Maximum depth: 50.08 (ft)
 Page 1 of 2



CPT Classification Chart

(after Robertson and Campanella, 1988)



Zone	q_t / N	Soil Behavior Type	UCSCS
1	2	sensitive fine grained	OL-OH
2	1	organic material	Pt-OH
3	1	clay	CH
4	1.5	silty clay to clay	CL-CH
5	2	clayey silt to silty clay	ML-CL
6	2.5	sandy silt to clayey silt	MH-ML
7	3	silty sand to sandy silt	SM-ML
8	4	sand to silty sand	SP-SM
9	5	sand	SP
10	6	gravelly sand to sand	SW-SP
11	1	very stiff fine grained *	CL-MH
12	2	sand to clayey sand *	SP-SC

* overconsolidated or cemented

Appendix C
Laboratory Testing Procedures and Test Results

APPENDIX C

Laboratory Testing Procedures and Test Results

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Classification and Grain Size Tests: Soil materials characteristic of the site were subjected to mechanical grain-size analysis by sieving from U.S. Standard brass screens (ASTM Test Methods C136 or D422). The data was evaluated in determining the classification of the materials. The grain-size distribution curves are presented on the attached figures, and Unified Soil Classification (USCS) is also presented on the boring logs.

Direct Shear Test: A direct shear test was performed on selected relatively undisturbed sample which that was soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box and reloading of the sample, the pore pressures set up in the sample (due to the transfer) were allowed to dissipate for a period of approximately 1 hour prior to application of shearing force. The samples were tested under various normal loads utilizing a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of 0.05 inches per minute. The test results are presented on the attached figure.

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed in general accordance with Caltrans Test Method CT643 for Steel or CT532 for concrete and standard geochemical methods. The results are presented in the table below:

Sample Location	Sample Description	pH	Minimum Resistivity (ohms-cm)
B-2 @ 10-15'	Brown to Reddish brown SILTY SAND	7.7	1199

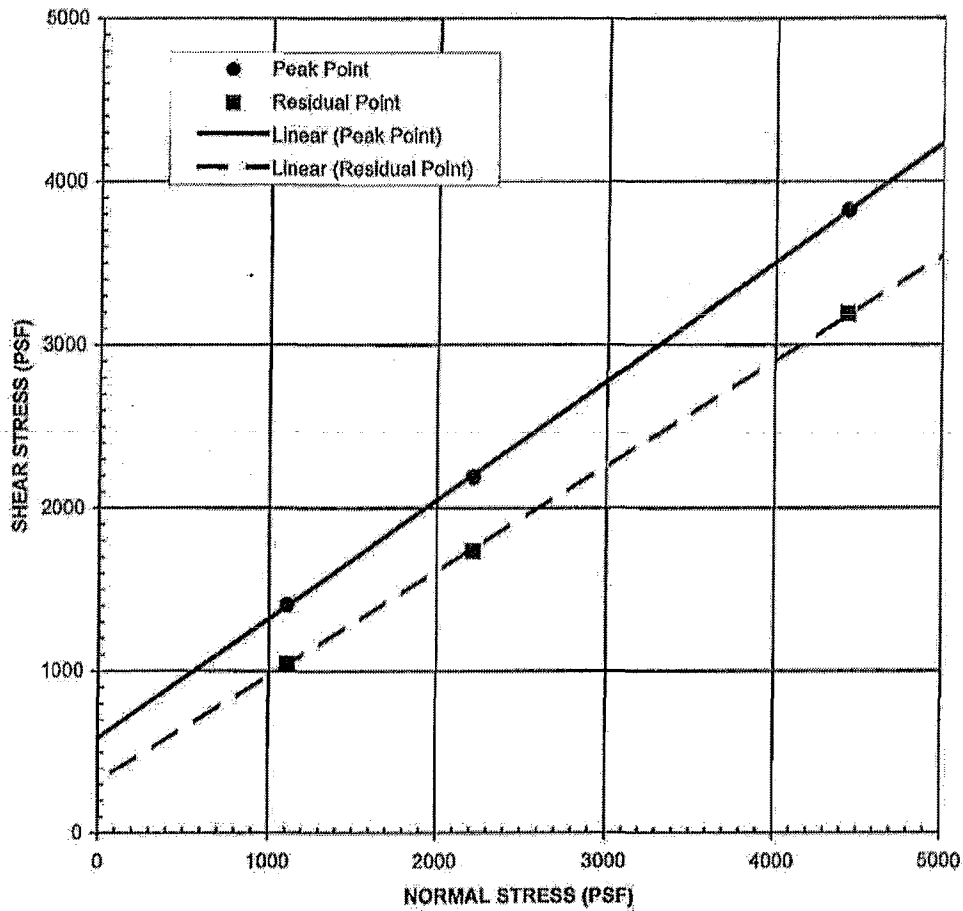
Chloride Content: Chloride content was tested in accordance with Caltrans Test Method CT422. The results are presented below:

Sample Location	Sample Description	Chloride Content, ppm
B-2 @ 10-15'	Brown to Reddish brown SILTY SAND	410

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geochemical methods (Caltrans Test Method CT417). The test results are presented in the table below:

Sample Location	Sample Description	Sulfate Content (%)	Potential Degree of Sulfate Attack*
B-2 @ 10-15'	Brown to Reddish brown SILTY SAND	<0.015	Negligible

* Based on the 2005 edition of American Concrete Institute (ACI) Committee 318R, Table No. 4.3.1.



				Interpreted Shear Strength			
				Peak		Relaxed	
Location	Sample No.	Depth (ft)	USCS	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
B-1	R-1	10-11.5	SM	589	36	318	33
Sample Description: Dark Brown to Reddish Brown Silty SAND							

Strain Rate = 0.05 in./min.

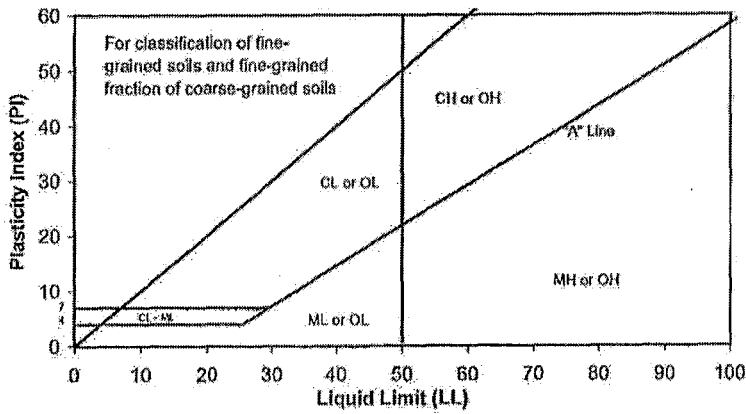
ASTM D 3080



DIRECT SHEAR TEST RESULTS

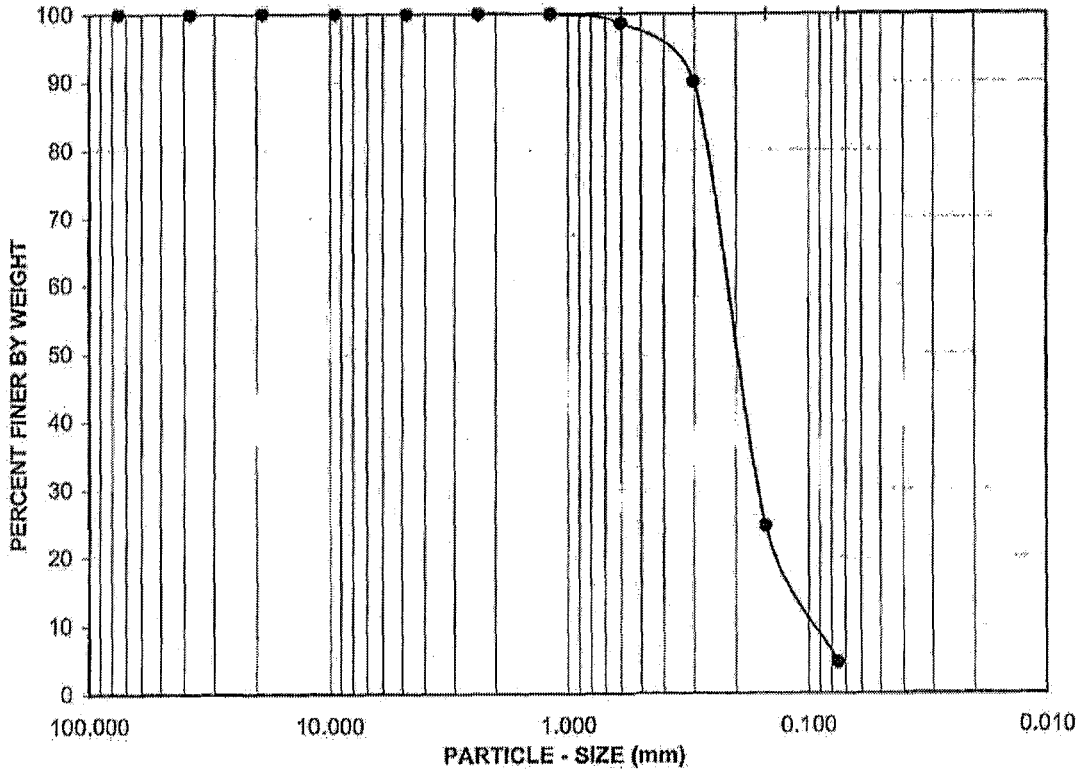
Project No. 042388-001

**Bayside Fire Station
San Diego, California**



GRAVEL		SAND			FINES
COARSE	FINE	COARSE	MEDIUM	FINE	SILT / CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8" #4 #8 #16 #30 #50 #100 #200
 U.S. STANDARD SIEVE NUMBER: 3.0" 1 1/2" 3/4" 3/8" #4 #8 #16 #30 #50 #100 #200



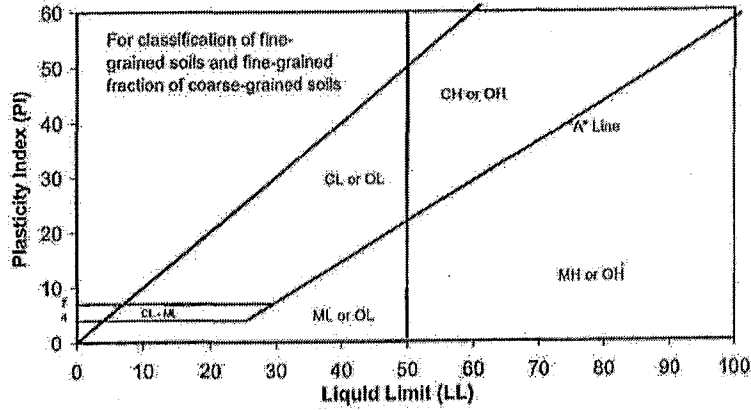
Boring No.:	Sample No.:	Depth (ft.):	Soil Type	GR:SA:FI	LL,PL,PI
B-2	R2	30.0-31.5	SP	0 : 95 : 5	N/A

Visual Sample Description:
 SP: PALE YELLOW-BROWN POORLY-
 GRADED SAND



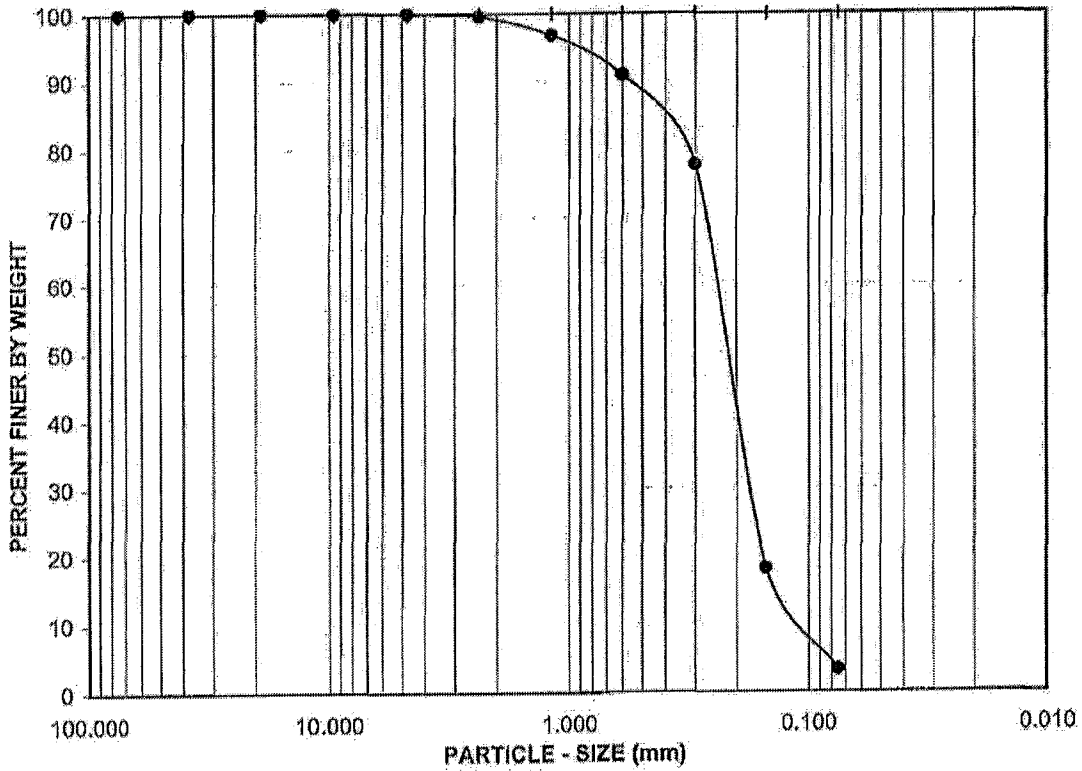
Project No.:	042388-001
BAYSIDE FIRE STATION, S.D., CA	
ATTERBERG LIMITS, PARTICLE - SIZE CURVE ASTM D 4318, D 422	

Rev. 12-04



GRAVEL		SAND			FINES
COARSE	FINE	COARSE	MEDIUM	FINE	SILT / CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8" #4 #8 #16 #30 #50 #100 #200
 U.S. STANDARD SIEVE NUMBER: 3.0" 1 1/2" 3/4" 3/8" #4 #8 #16 #30 #50 #100 #200



Boring No.:	Sample No.:	Depth (ft.):	Soil Type	GR:SA:FI	LL,PL,PI
B-1	R2	20.0-21.5	SP	0 : 97 : 3	N/A

Visual Sample Description:
 SP: PALE GRAY-BROWN POORLY-
 GRADED SAND



Project No.: 042398-001

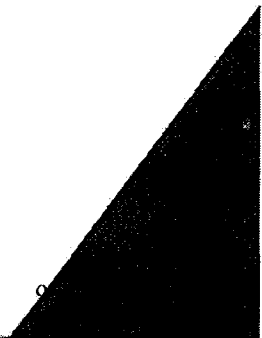
BAYSIDE FIRE STATION, S.D., CA

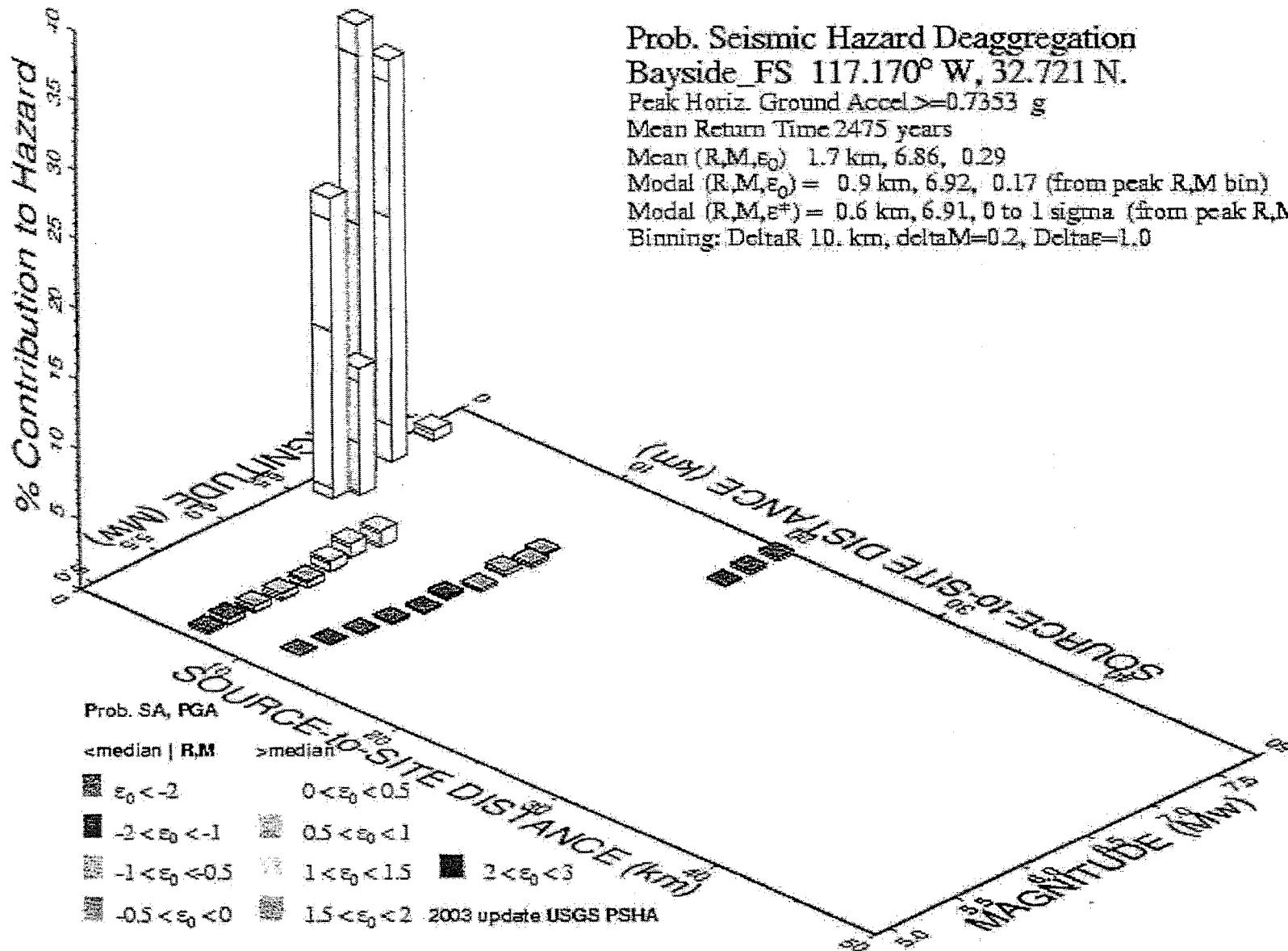
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 ASTM D 4318, D 422

Rev. 12/04

SIEVE B-1,R2

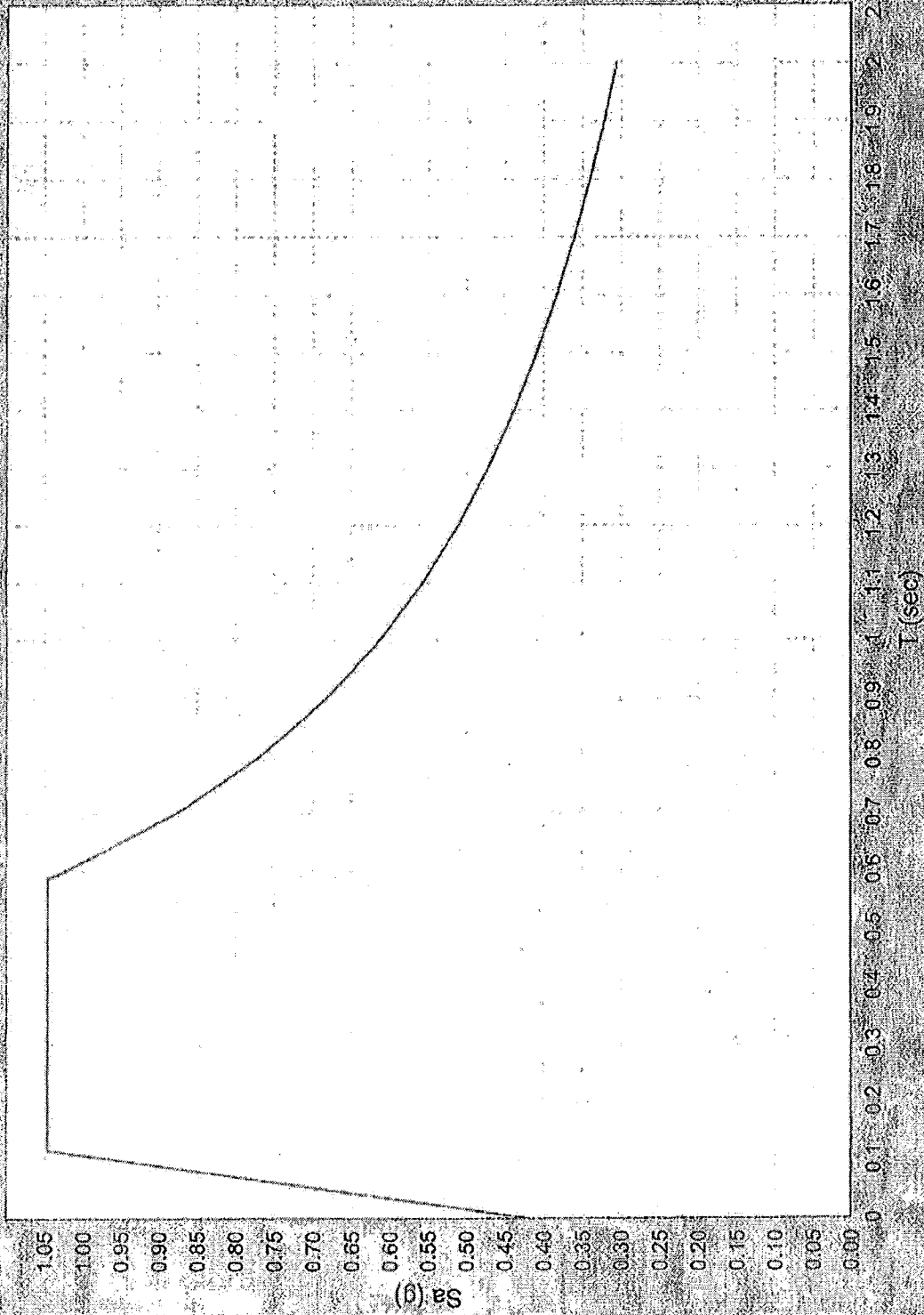
Appendix D
Seismic Analysis





GINT 2009 Mar 25 17:06:43 Distance (R), magnitude (M), epsilon (E) deaggregation for a site on ROCK avg $N_s=780$ m/s top 30 m USGS CGIT PSHA2003r3 UPDATE Bins with 0.05% contrib. omitted

Design Spectrum Sa Vs T

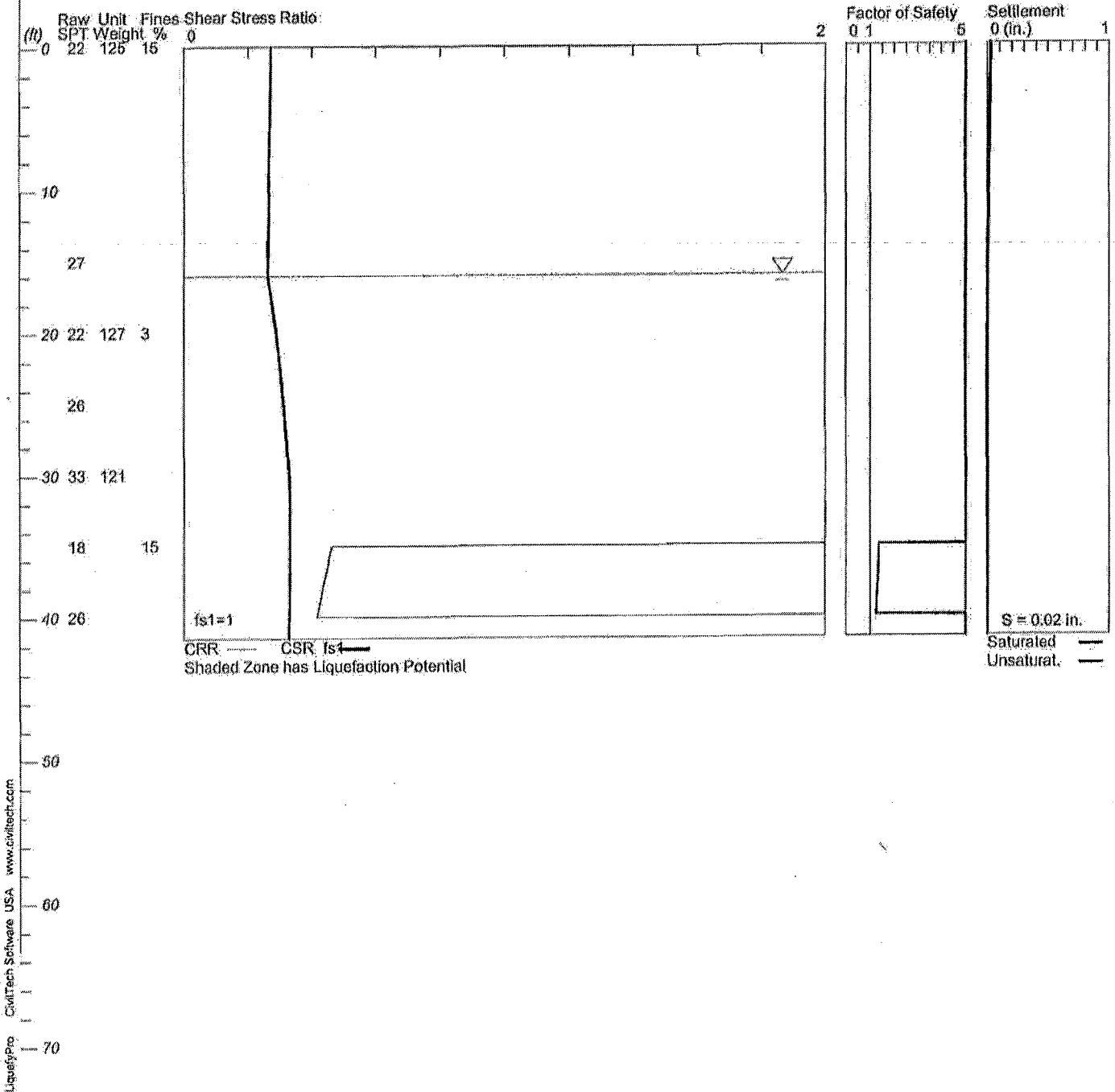


LIQUEFACTION ANALYSIS

Bayside Fire Station

Hole No.=B-1 Water Depth=16 ft Surface Elev.=14

Magnitude=6.9
Acceleration=0.42g



Leighton

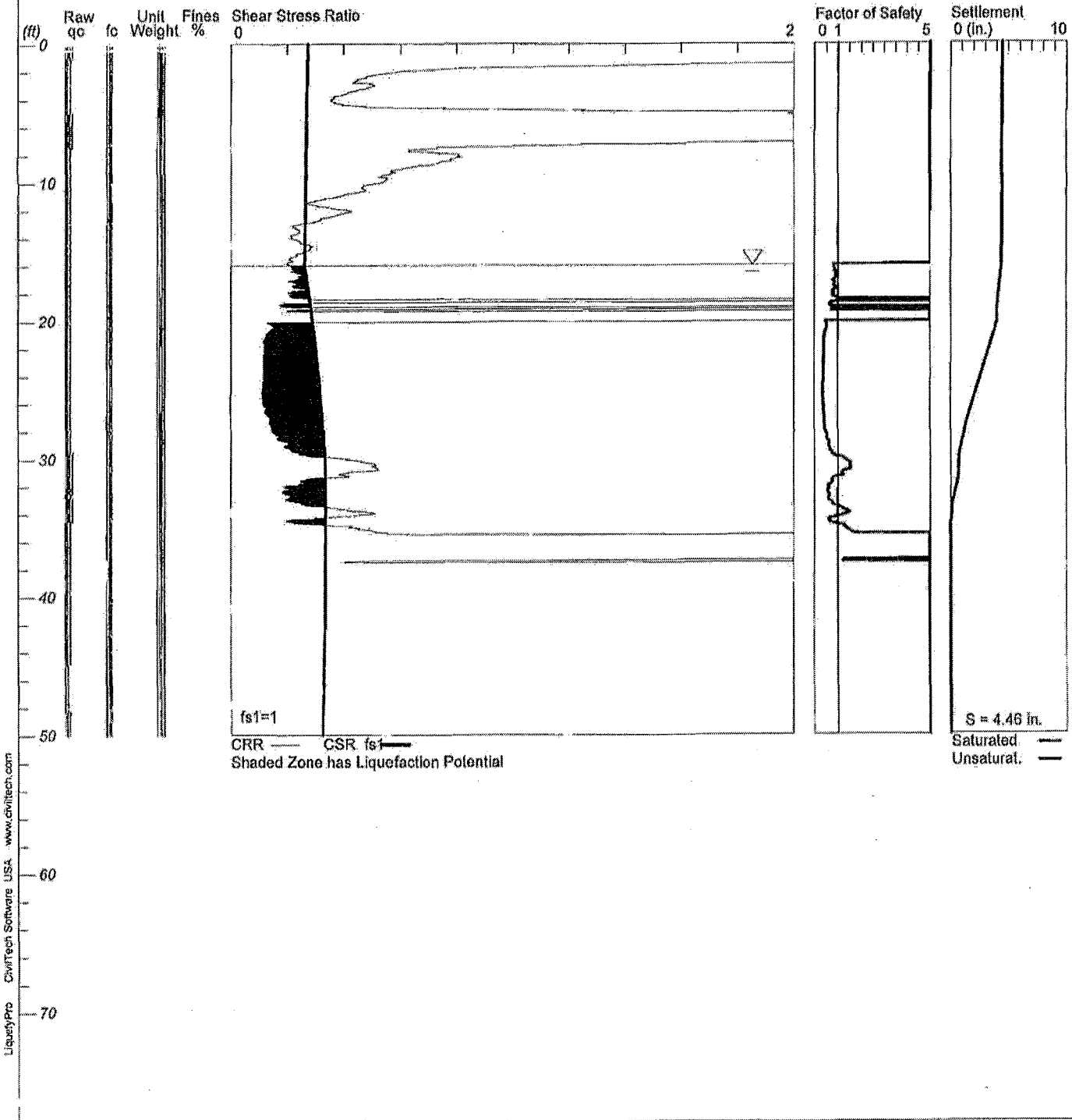
042388-001

LIQUEFACTION ANALYSIS

Bayside Fire Station

Hole No.=CPT-1 Water Depth=16 ft Surface Elev.=12

Magnitude=6.9
Acceleration=0.42g



LiquifyPro CivilTech Software USA www.civiltech.com



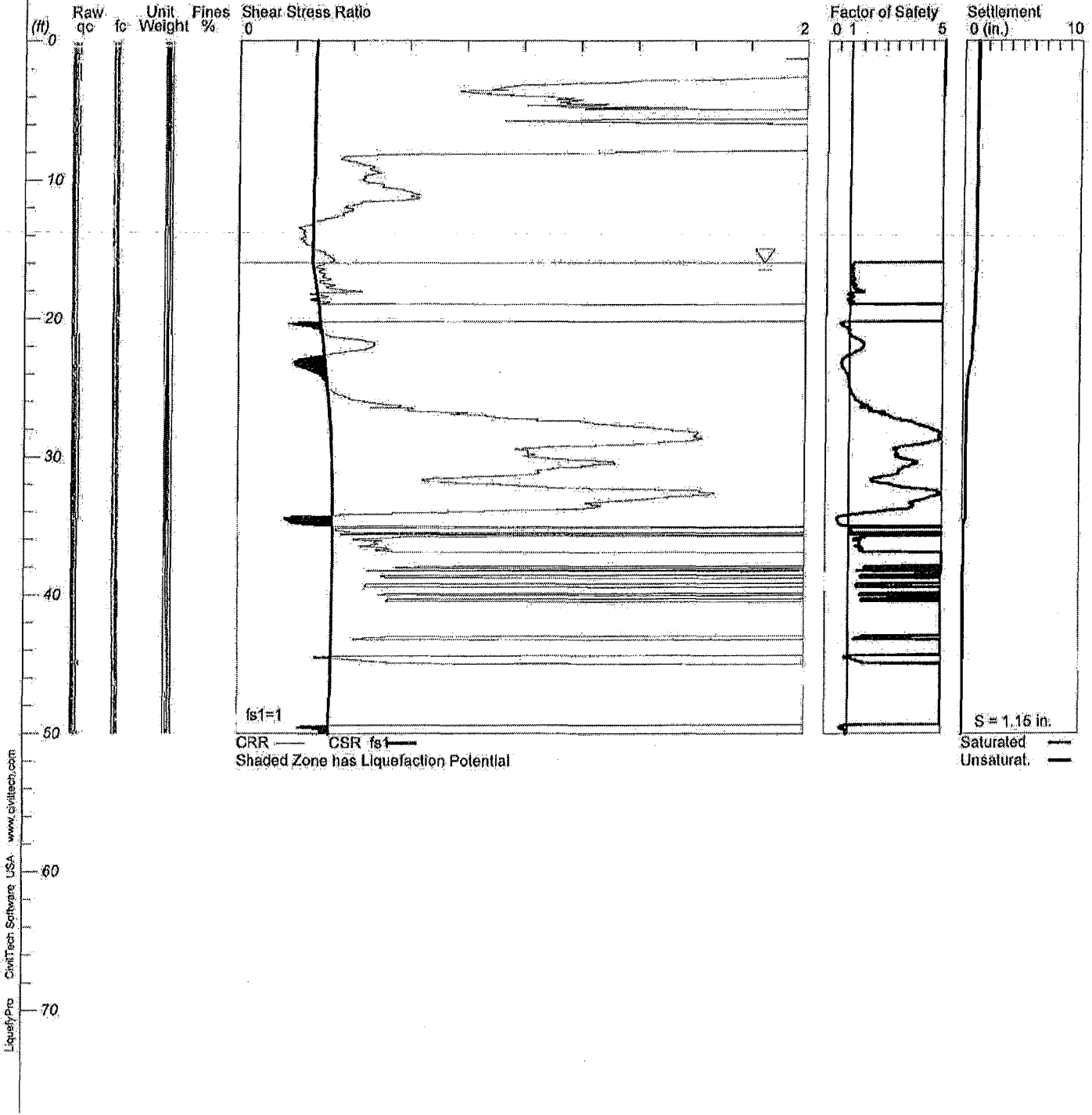
042388-001

LIQUEFACTION ANALYSIS

Bayside Fire Station

Hole No.=CPT-2 Water Depth=16 ft Surface Elev.=12

Magnitude=6.9
Acceleration=0.42g



Leighton

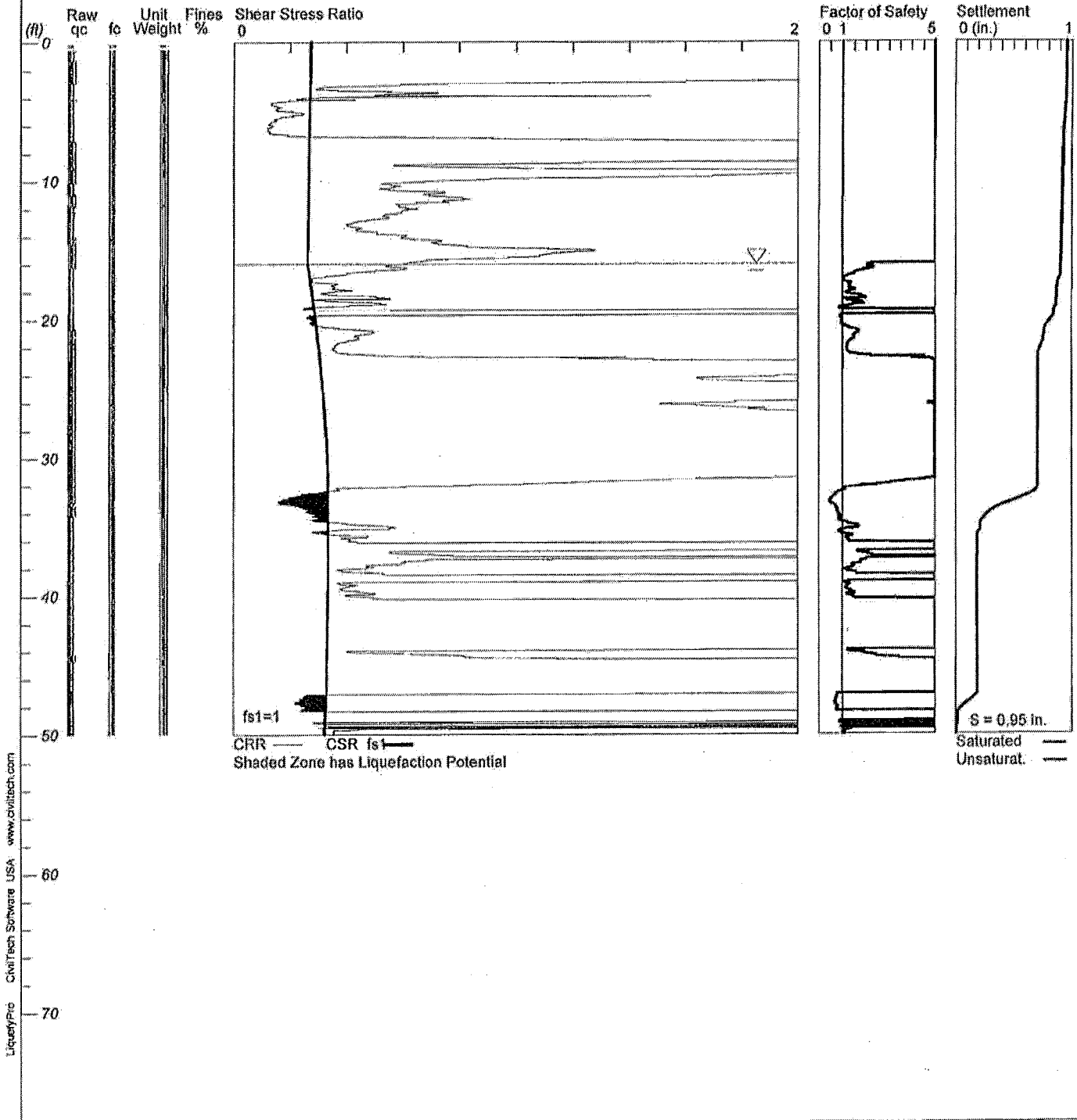
042388-001

LIQUEFACTION ANALYSIS

Bayside Fire Station

Hole No.=CPT-3 Water Depth=16 ft Surface Elev.=12

Magnitude=6.9
Acceleration=0.42g



Leighton

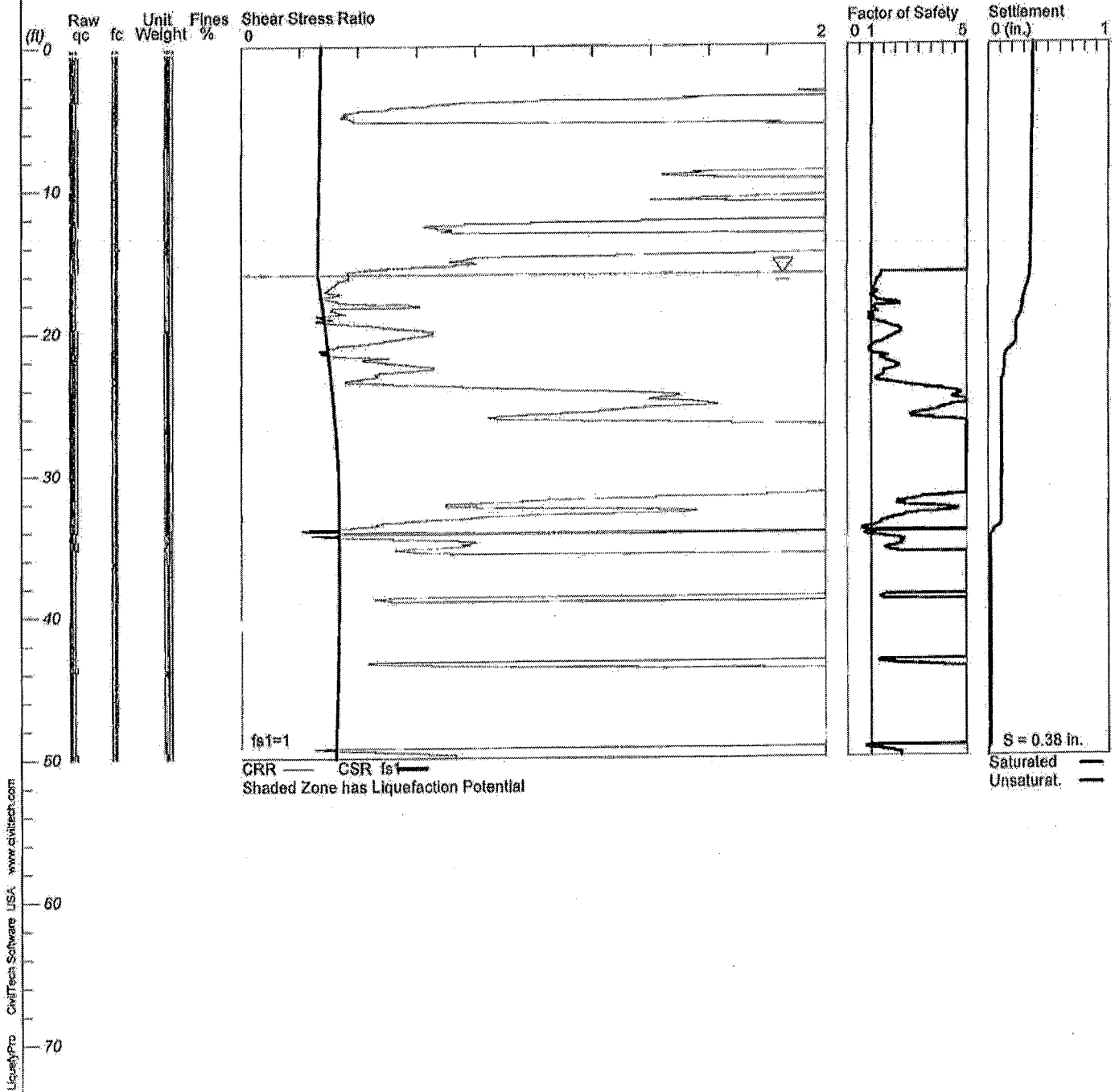
042388-001

LIQUEFACTION ANALYSIS

Bayside Fire Station

Hole No.=CPT-4 Water Depth=16 ft Surface Elev.=12

Magnitude=6.9
Acceleration=0.42g



Leighton

042388-001

Appendix E
General Earthwork and Grading Specifications for Rough Grading

LEIGHTON AND ASSOCIATES, INC.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record: Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

- 1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

- 2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

- 2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.
- 2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.
- 2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.
- 2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

- 3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.
- 3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

- 3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

- 4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.
- 4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-07).
- 4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-07). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.
- 4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-07.
- 4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).
- 4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

- 4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

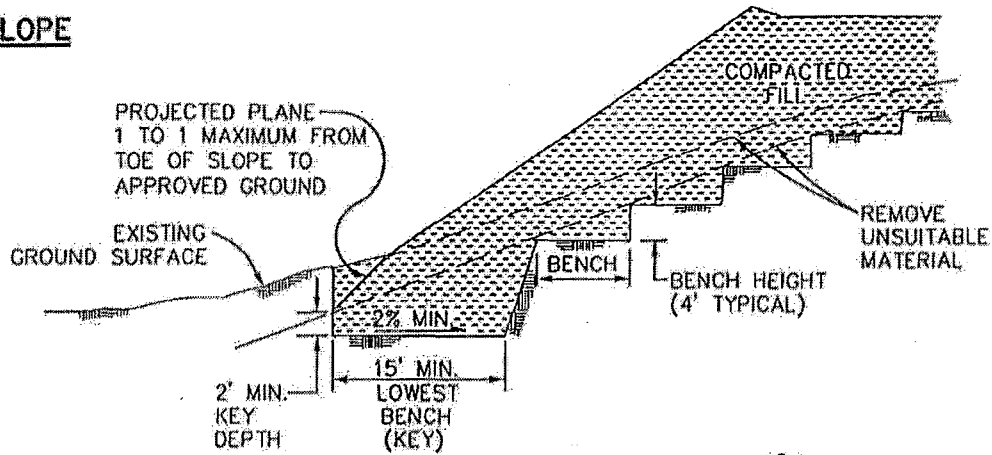
6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

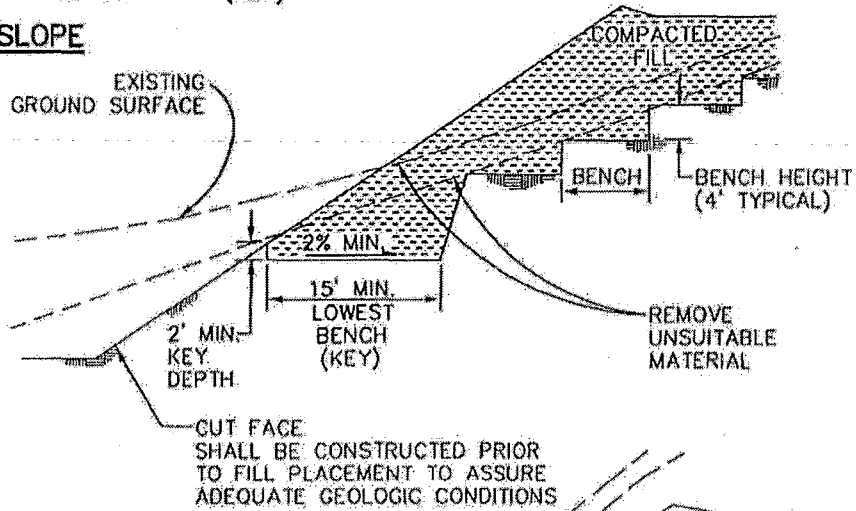
7.0 Trench Backfills

- 7.1 The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.
- 7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 ($SE > 30$). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.
- 7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.
- 7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.
- 7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

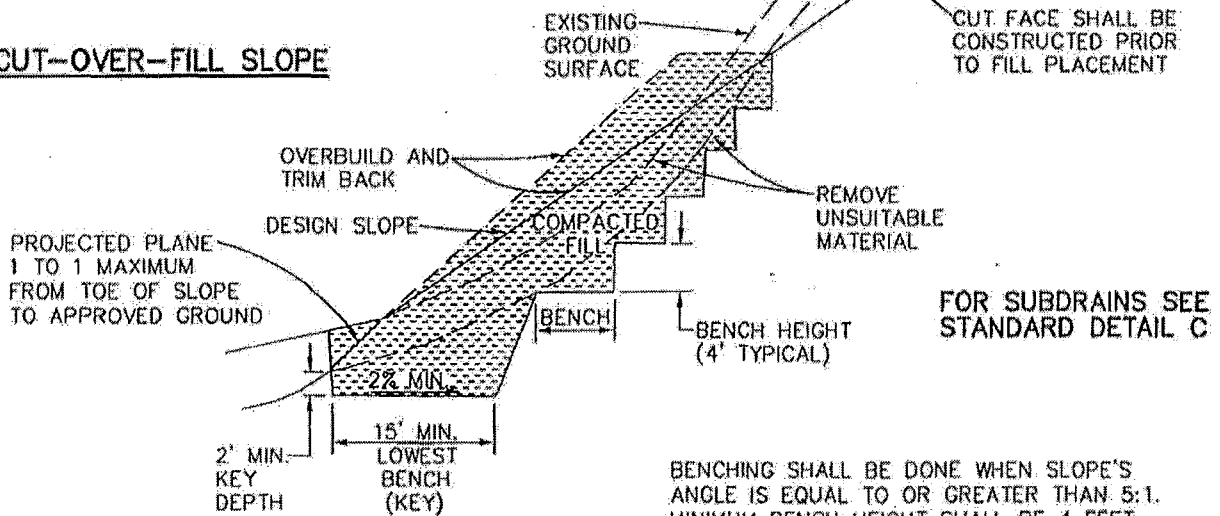
FILL SLOPE



FILL-OVER-CUT SLOPE

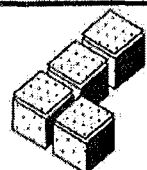


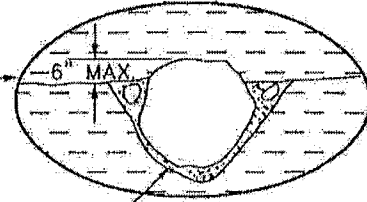
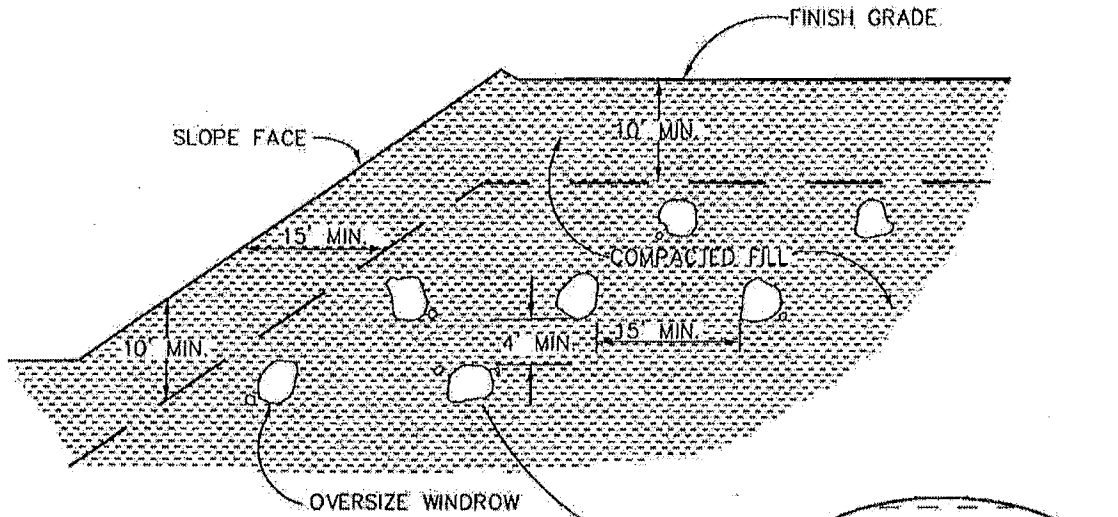
CUT-OVER-FILL SLOPE



KEYING AND BENCHING

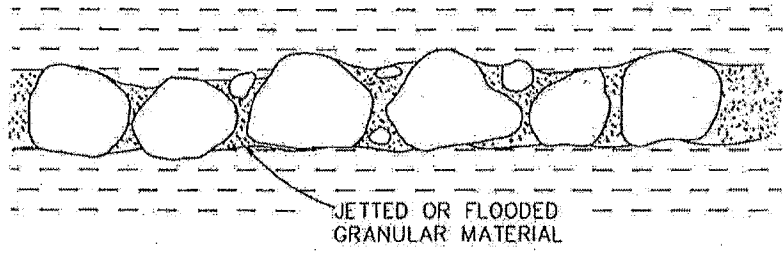
GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAILS A





- * OVERSIZE ROCK IS LARGER THAN 8 INCHES IN LARGEST DIMENSION.
- * EXCAVATE A TRENCH IN THE COMPACTED FILL DEEP ENOUGH TO BURY ALL THE ROCK.
- * BACKFILL WITH GRANULAR SOIL JETTED OR FLOODED IN PLACE TO FILL ALL THE VOIDS.
- * DO NOT BURY ROCK WITHIN 10 FEET OF FINISH GRADE.
- * WINDROW OF BURIED ROCK SHALL BE PARALLEL TO THE FINISHED SLOPE.

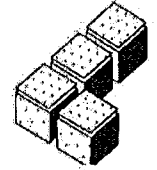
GRANULAR MATERIAL TO BE DENSIFIED IN PLACE BY FLOODING OR JETTING.

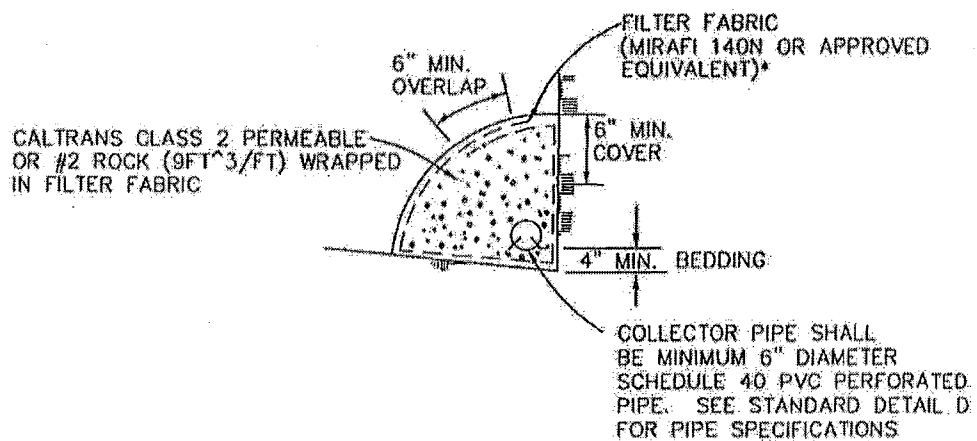
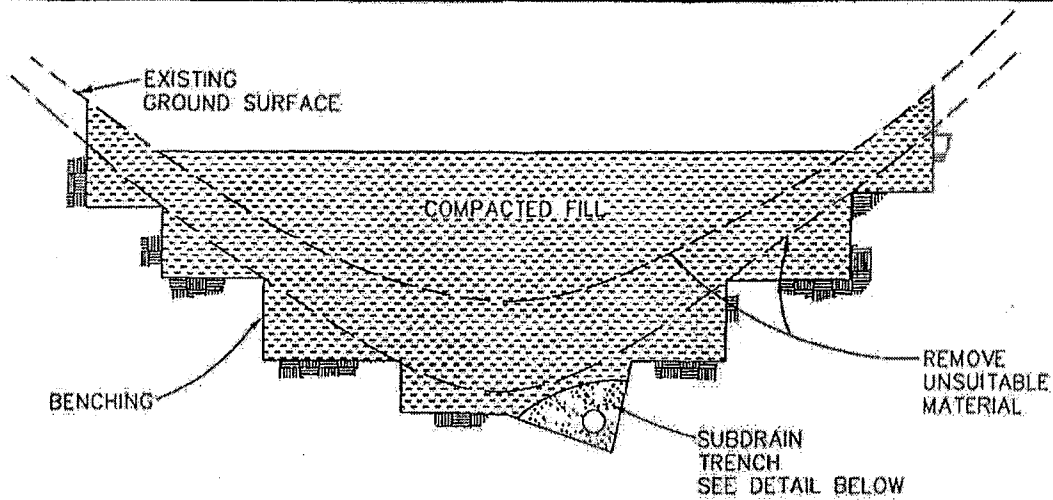


TYPICAL PROFILE ALONG WINDROW

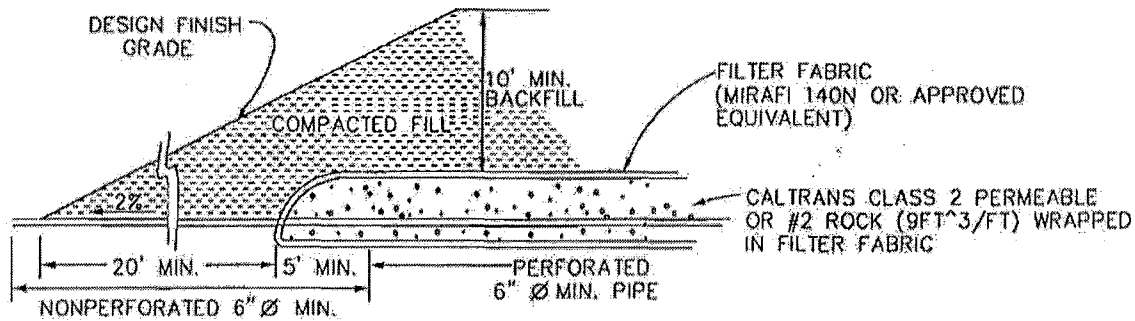
**OVERSIZE
ROCK DISPOSAL**

GENERAL EARTHWORK AND
GRADING SPECIFICATIONS
STANDARD DETAILS B





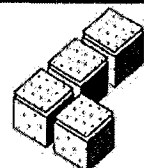
SUBDRAIN DETAIL

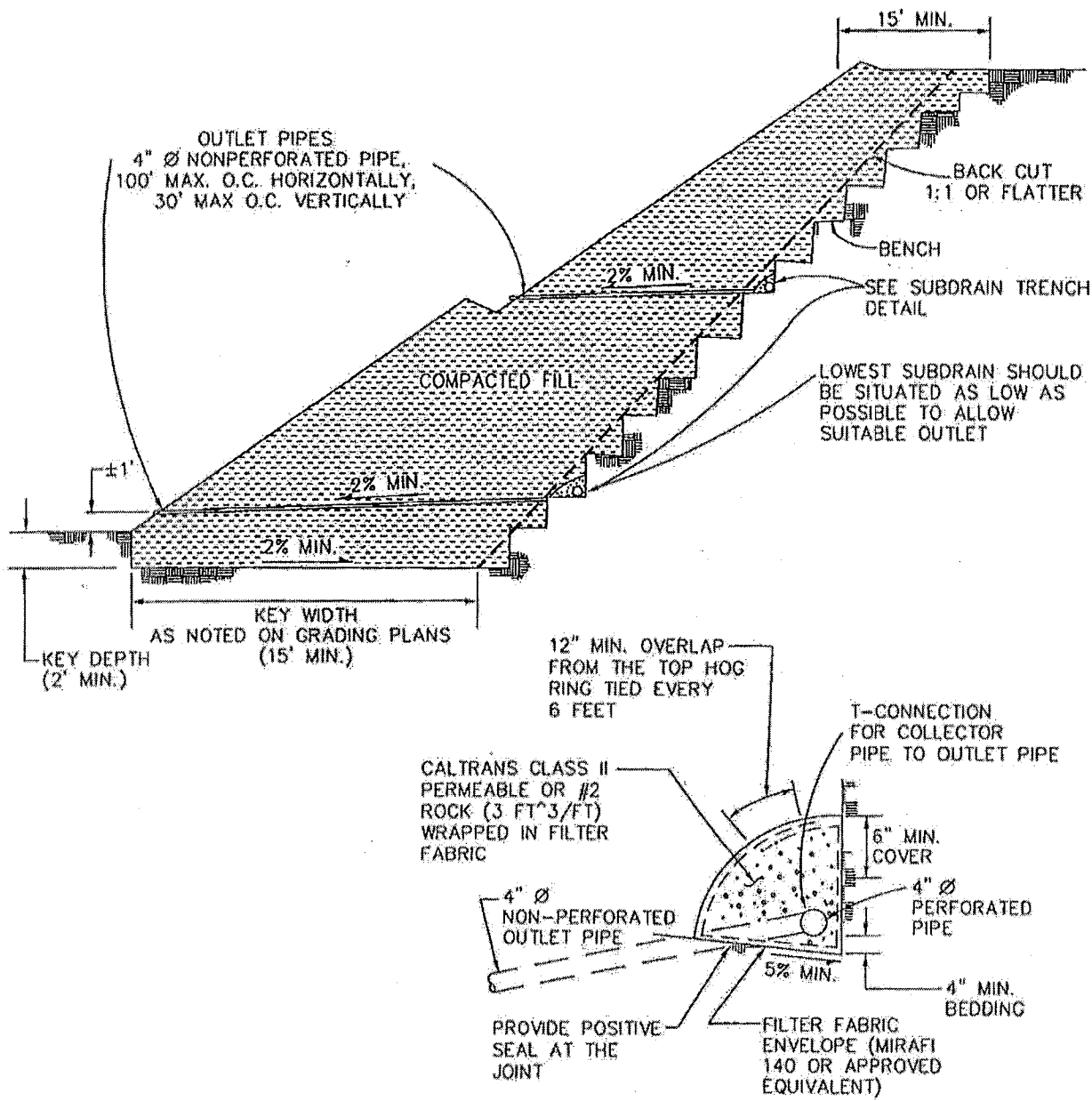


DETAIL OF CANYON SUBDRAIN OUTLET

CANYON SUBDRAINS

GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS C





SUBDRAIN TRENCH DETAIL

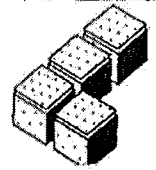
SUBDRAIN INSTALLATION – subdrain collector pipe shall be installed with perforation down or, unless otherwise designated by the geotechnical consultant. Outlet pipes shall be non-perforated pipe. The subdrain pipe shall have at least 8 perforations uniformly spaced per foot. Perforation shall be 1/4" to 1/2" if drill holes are used. All subdrain pipes shall have a gradient of at least 2% towards the outlet.

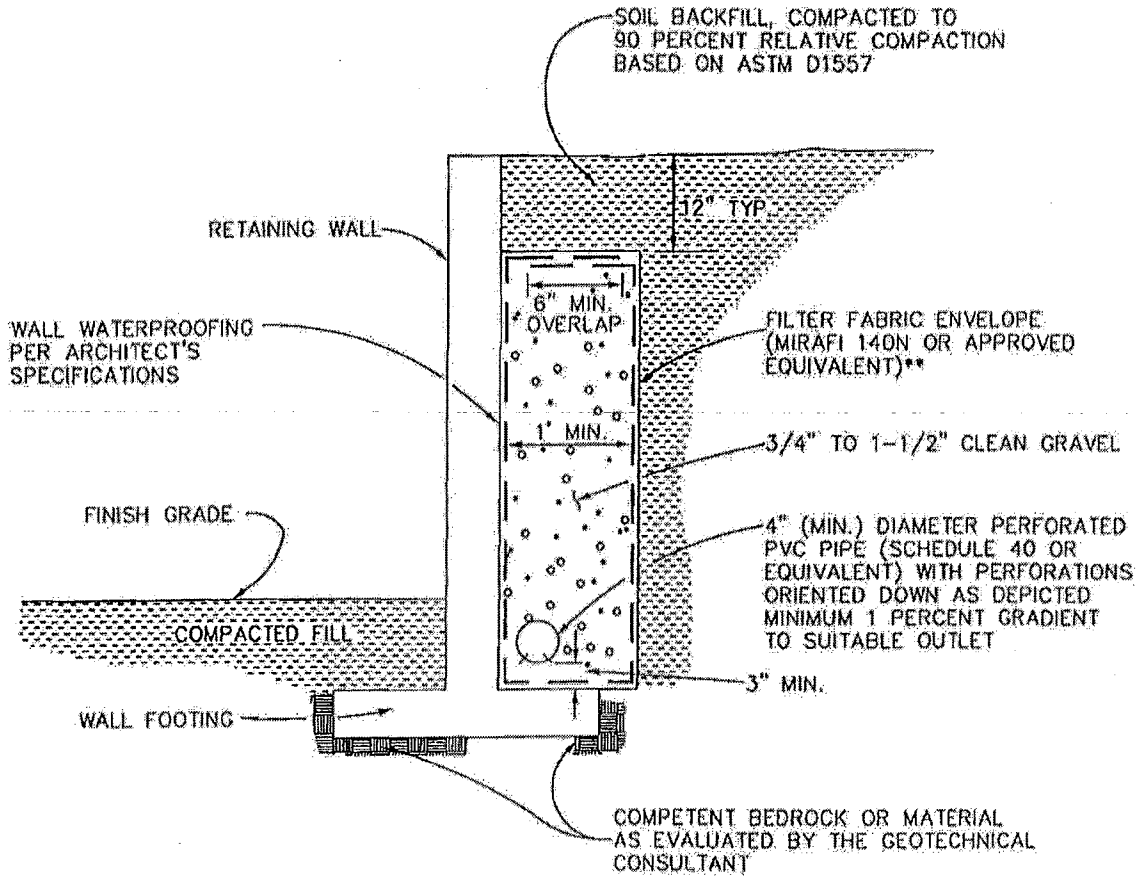
SUBDRAIN PIPE – Subdrain pipe shall be ASTM D2751, SDR 23.5 or ASTM D1527, Schedule 40, or ASTM D3034, SDR 23.5, Schedule 40 Polyvinyl Chloride Plastic (PVC) pipe.

All outlet pipe shall be placed in a trench no wide than twice the subdrain pipe. Pipe shall be in soil of SE >=30 jetted or flooded in place except for the outside 5 feet which shall be native soil backfill.

**BUTTRESS OR
REPLACEMENT FILL
SUBDRAINS**

**GENERAL EARTHWORK AND
GRADING SPECIFICATIONS
STANDARD DETAILS D**

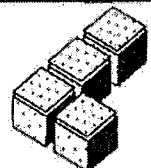




NOTE: UPON REVIEW BY THE GEOTECHNICAL CONSULTANT, COMPOSITE DRAINAGE PRODUCTS SUCH AS MIRADRAIN OR J-DRAIN MAY BE USED AS AN ALTERNATIVE TO GRAVEL OR CLASS 2 PERMEABLE MATERIAL. INSTALLATION SHOULD BE PERFORMED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

**RETAINING WALL
DRAINAGE DETAIL**

**GENERAL EARTHWORK AND
GRADING SPECIFICATIONS
STANDARD DETAILS E**



Appendix F
ASFE Insert

Important Information About Your Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time to perform additional study.* Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention.* *Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/THE BEST PEOPLE ON EARTH exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.



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APPENDIX H
SDGE & VAULT SERVICE ORDERS

BAYSIDE FIRE STATION #2

June 22, 2015

SDG&E ELECTRIC INSTALLATION

WORK ORDER V-1825 TRANSFORMER VAULT

- SDG&E TRANSFORMER VAULT DESIGN V-1825
- SDG&E ELECTRIC VAULT REQUIREMENTS AND SPECIFICATIONS (PAGES 1 THROUGH 30)
- CUSTOMER VAULT EQUIPMENT OPENING THREE PIECE COVER (STANDARD 3333.1 TO 3333.4)

WORK ORDER 2943780 - SDG&E ELECTRIC REARRANGEMENT

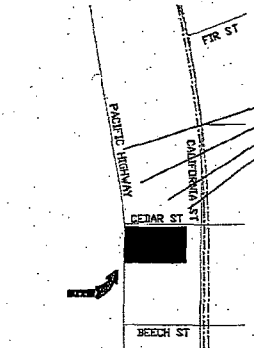
- SDG&E REARRANGEMENT DESIGN SKETCH (SHTS 1 OF 2 & 2 OF 2)
- DPSS MATERIAL SHEETS
- STANDARD PAGES

SAN DIEGO GAS & ELECTRIC REARRANGEMENT AND TRANSFORMER VAULT CONSTRUCTION

THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK AND MATERIAL REQUIRED TO CONSTRUCT THE TRANSFORMER VAULT PER THE "SDG&E ELECTRIC VAULT REQUIREMENTS AND SPECIFICATIONS".

THE CONTRACTOR WILL PERFORM ALL TRENCHING, EXCAVATION, BACKFILLING AND COMPACTION, AND WILL FURNISH AND INSTALL ALL DISTRIBUTION CONDUITS AND SUBSTRUCTURES REQUIRED. THIS WILL BE DONE IN ACCORDANCE WITH SDG&E'S GENERAL CONDITIONS AND SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR MANDRELING ALL CONDUITS AND INSTALLING PULL ROPES. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRAFFIC CONTROL AS WELL AS REMOVAL AND REPLACEMENT OF ANY ASPHALT, CURB, GUTTER AND SIDEWALK REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK AND MATERIAL REQUIRED TO COMPLETE THE INSTALLATION OF THE UNDERGROUND ELECTRIC FACILITIES UNDER THE ELECTRIC EXTENSION RULES.

BAYSIDE FIRE DEPARTMENT



VICINITY MAP
N1 SCALE 1288-J2

NOTES

CUSTOMER IS RESPONSIBLE FOR TRENCH EXCAVATION AND MANHOLE REPAIRS INCLUDING HOLES AND ADAPTERS AT UNHANDLED INDUSTRIALS. WORKING FOR THE BREAK & REPAIR METASTAND WALLS.

MAINTAIN A RECORD UP OF WHEN PARALLELING NEW UTILITIES IF WHEN CROSSING.

STANDARD CONDUIT SIZES TO BE USED:

CONDUIT SIZES	CONDUIT SIZES
1/2"	1/2"
3/4"	3/4"
1"	1"
1 1/4"	1 1/4"
1 1/2"	1 1/2"
2"	2"
2 1/2"	2 1/2"
3"	3"
3 1/2"	3 1/2"
4"	4"
4 1/2"	4 1/2"
5"	5"
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97"	97"
97 1/2"	97 1/2"
98"	98"
98 1/2"	98 1/2"
99"	99"
99 1/2"	99 1/2"
100"	100"
100 1/2"	100 1/2"

ALL VERTICAL BENDS WILL BE MADE WITH 90 DEGREE SWEEPS AS PER STD. PRACTICE UNLESS OTHERWISE NOTED.

THE MAIN PANEL IS 800A WHICH WILL BE SERVED BY CABLE THROUGH IN THE VAULT FLOOR.

IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRENCH AND CONDUIT TO THE EXISTING SERVICE. CITY CONSULT STOPS ARE DETAILLED FOR THE FUTURE USE OF THE UTILITY. THE CITY IS RESPONSIBLE FOR THE WORKERS MAY BE IN THE TRENCH OTHERWISE, DETAIL NEW TRENCH AND CONDUIT TO THE SERVICE.

24 HOUR LOW TRUCK ACCESS TO SOME DISTRIBUTION AND SERVICE FACILITIES REMAINS.

DESIGN BASED ON 120 AMPERS HP A/C.

ESTIMATED DEMAND 150KVA @ 60HZ.

DEVELOPER/CITY OF SAN DIEGO
PHONE (619) 523-7263

CUSTOMER REP GARY BROWN
COMPANY CENTRE CITY DEVELOPMENT CORP
PHONE (619) 523-7263

SOME CUSTOMER PROJECT PLANNER STEVE KUSSMAN
PHONE (619) 523-7263

13 REMOTE LOCATIONS FOR GROUNDING
D2034571697 FUSE CABINET
D2033871705 STATION
D194769 STATION
D146088 STATION

1 M2033671700
EX. 3324

2 LOCATE & INTERCEPT
1-DB3 PRIM & 1-DB2 SEC
RFS EX 3-#2 PECN-PEJ AL
INSTALL 3-#2 PECN-PEJ AL
250' +/-

5 RFS STA 179-93
1-75 HP
D2031871708

7 M100481
EX. 3324

OLD ABANDON MH, HH, CONDUIT, AND CABLE SYSTEM. ALL CONDUITS TESTED AT STRUCTURES BY AEG ON 8-23-2011 AND FOUND TO CONTAIN NO ASBESTOS MATERIAL.

3 LOCATE & INTERCEPT
1-DB3
RFS EX. 3# 1/0 SECONDARY CABLE
INSTALL 1# #2 SECONDARY CABLE
130' +/-

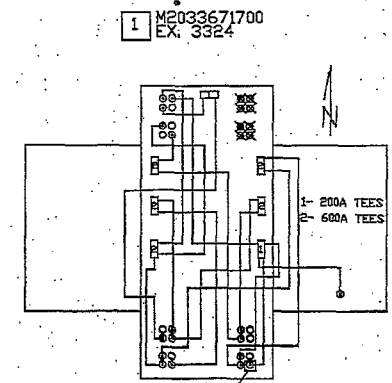
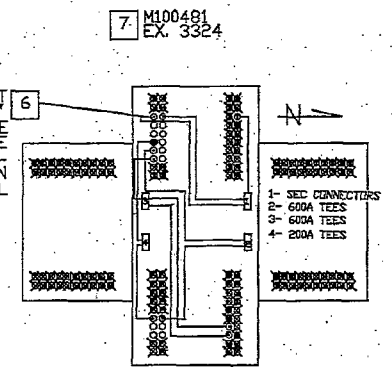
4 EX. 3312

VAULT
U108939
SEE SHT. #2

6 LOCATE & INTERCEPT
1-DB4
RFS EX 3# #3/0 SECONDARY CABLE
INSTALL 3# #3/0 SECONDARY CABLE
170' +/-

2 LOCATE & INTERCEPT
1-DB3
RFS EX 3-#2 PECN-PEJ AL
INSTALL 3-#2 PECN-PEJ AL
130' +/-

LOCATE & INTERCEPT
1-DB4
RFS EX. 3# #3/0 SECONDARY CABLE
INSTALL 3# #3/0 SECONDARY CABLE
170' +/-
CONFIRM CABLE LOCATION AT TIME OF INSTALL



BAYSIDE FIRE DEPARTMENT

2943780
SDGE ELECTRIC CONSTRUCTION ORDER
BY/DATE: JASON SELLER 06/20/11
PROJECT NO. 061621-010
2943780
1 OF 2

BAYSIDE FIRE DEPARTMENT

VAULT U108939



SCALE
0 20

VICINITY MAP
NO SCALE 1288-J2

BAYSIDE FIRE DEPARTMENT

2943780

SDGE
SAN DIEGO GAS & ELECTRIC
ELECTRIC CONSTRUCTION ORDER
HARDWARE DIVISION

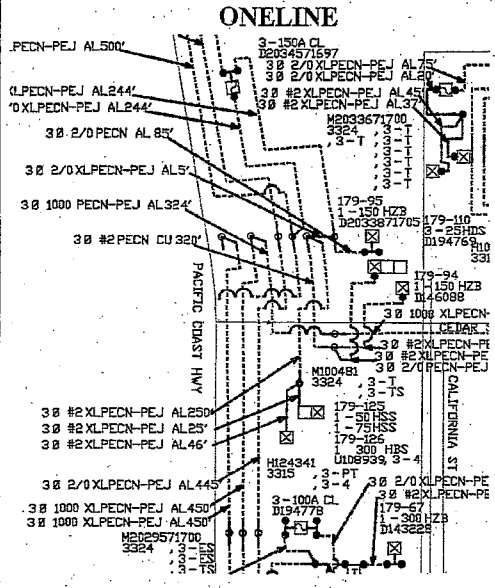
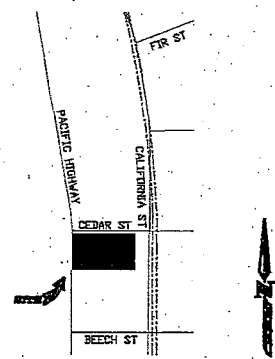
DATE 09/20/11
PROJECT NO. 081621-010

2943780

REV 01/2

Call 811 Two Working Days Before You Dig!

985 | Page

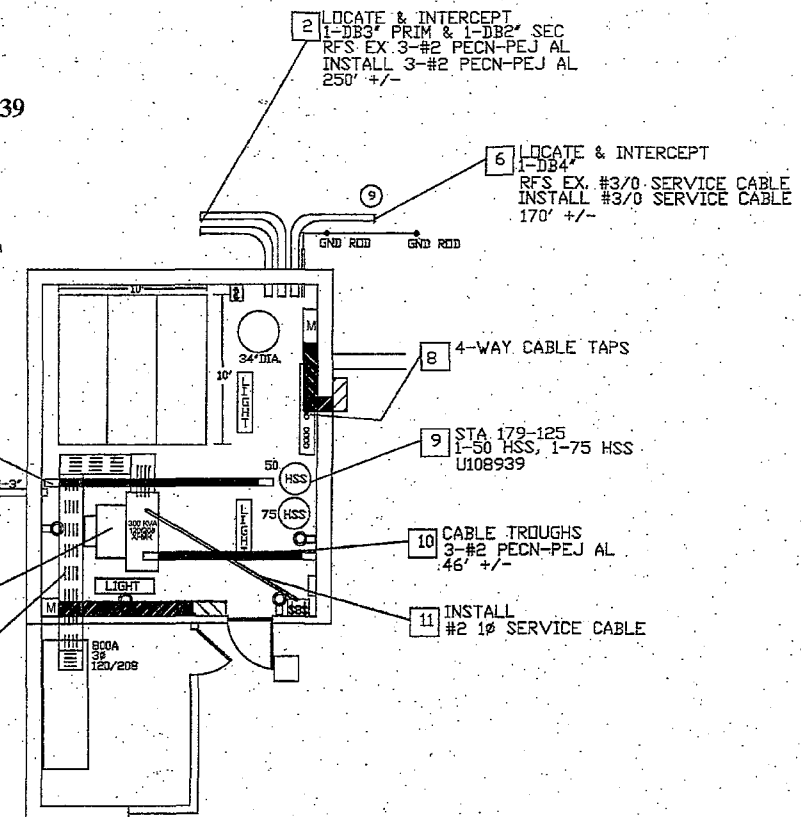


CABLE TROUGHS FOR
1# #2 SERVICE CABLE

LOCATE & INTERCEPT
1-DB3'
RFS EX. 1/0 3# SERVICE CABLE
INSTALL #2 1# SERVICE CABLE

STA 179-126
1-300 HBS
U108939
8 BRAIDS REQUIRED

CUSTOMER BUS DUCT



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2943780

BAYSIDE FIRE DEPARTMENT VAULT DESIGN U108939



SCALE
0 20'

BAYSIDE FIRE DEPARTMENT
VAULT DESIGN

2943780

DESIGNED BY
SDGE ELECTRIC
DIVISION

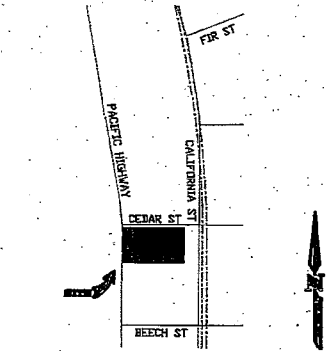
PROJECT NO.
081821-020

V-1825

1 OF 1



Call 24/7 No Working Days Before You Die!



VICINITY MAP
NO SCALE 1288-J2

NOTES

CONCRETE	REINFORCEMENT	CONCRETE	REINFORCEMENT
4" CONC.	#4 @ 18" ON CENTER	4" CONC.	#4 @ 18" ON CENTER
6" CONC.	#4 @ 18" ON CENTER	6" CONC.	#4 @ 18" ON CENTER
8" CONC.	#4 @ 18" ON CENTER	8" CONC.	#4 @ 18" ON CENTER
10" CONC.	#4 @ 18" ON CENTER	10" CONC.	#4 @ 18" ON CENTER

SERVICE GABLE FULL CASE/ENTIRE ROOF OF CONCRETE MUST ALLOW A MINIMUM 6" GAP CLEAR & LEVEL WORKING SPACE IN FRONT OF THE FULL CONVECTION.

IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRENCH AND GROUNDING TO THE UNDERSIDE SLABS. EMPTY CONDUIT STUBS ARE INSTALLED FOR THE FUTURE USE OF THE UTILITY. IF THE STUB IS UNWANTED, THE CUSTOMER MUST ORDER TO REMOVE THE STUB. OTHERWISE, INSTALL NEW TRENCH AND CONDUIT TO THE STUBS.

84 HOUR LINE TRACK ACCESS TO EQUAL DISTRIBUTION AND SERVICE FACILITIES REQUIRED.

DEVELOPER/OWNER: CITY OF SAN DIEGO

PHONE: 650-533-7629

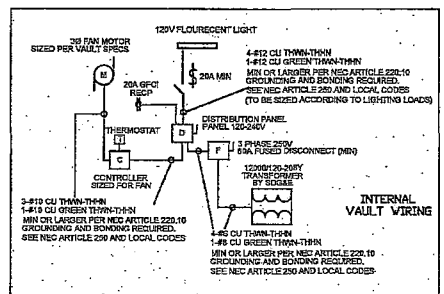
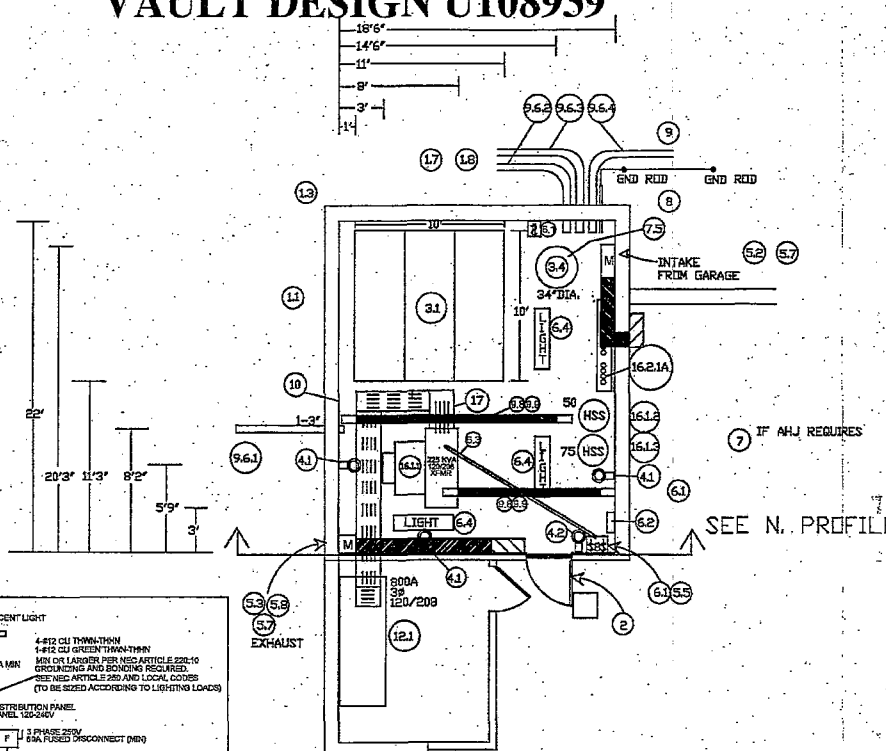
CUSTOMER REP ONLY NEEDS:

COMPANY: CENTRIC CITY DEVELOPMENT CORP.

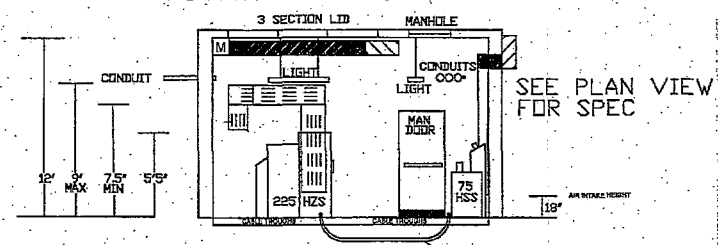
PHONE: 650-533-7629

SCALE: CUSTOMER PROJECT PLANNER STEVE KUSZMAN

PHONE: 650-533-7629



NORTH PROFILE



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2943780

S:\SH\BREL_NEW BUSINESS DESIGNERS - METRO (ADM-10-06 MAX) \Uason Sellar\Projects\2943780 BAYSIDE FIRE DEPARTMENT\2943780.dwg, 09/06/2011, 11:30:53 AM, WPS-CPC-P1551P-013C

Customer

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
 LOCATION: CEDAR & PACIFIC HWY ADDRESS: CITY: SD THOMAS BROTHERS: 1288-J2
 DISTRICT: CM ADDRESS: 701-C 33RD ST SAN DIEGO, 92102 PH: 619-699-1039 COST CENTER: SLO:
 DESIGNED BY: JASON S SEILER PH: 858-636-3992 DATE ISSUED: SIO:
 JOB COORD: STEVEN D KUSSMAN PH: 858-636-3918 PROJECT MGR: STEVEN D KUSSMAN PH: 858-636-3918
 APPROVED BY: *Steven D Kussman* DATE: *9/7/2011* COMBO JOB:N

WORK REQ#	RULE	OPT	BILL CODE	ORDER TYPE	QTY	BUDGET	BUDGET %	TOTAL CAPITAL	BILLABLE CAPITAL	%	DEPREC CREDIT	NET CAPITAL	TOTAL O&M	BILLABLE O&M	%	NET O&M
001	E-16	D	A	34	1	11218.1	21.1	9420	0	0.0		9420	954	0	0.0	954
002		D	X	67	0	11225.1	78.9	35308	35309	100.0		-1	1912	1912	100.0	0
TOTAL						100.0		44728	35309	78.9		9419	2866	1912	66.7	954

SCHED START DATE: / / SCHED COMP DATE: / / COMPLETED/APPROVED BY: DATE:

REQUIRED ACCOUNTS

5108.40000 5184.63200 5360.20000 5366.00000 5367.10000 5369.20000 5594.50000

JOINT CONSTRUCTION CONTRACTOR DESIGN: APPLICANT DESIGN:
 UG ELECT: N
 GAS: N
 TELCO: N TELCO ENG: PHONE:
 MPOE: N
 CATV: N CATV ENG: PHONE:
 COMMENTS:

RIGHT-OF-WAY REQUIRED: Y INFO:
 PERMITS REQUIRED: N AGENCY:
 TRAFFIC CONTROL REQ: Y PLAN NO: STREET RESURFACE MORATORIUM: N CUSTOMER OUTAGE REQUIRED: Y
 COMMENTS:

EXISTING FACILITIES INSTALLED ON: 2247940

RELATED CONSTRUCTION JOBS

PLANS / REFERENCE MAPS

WO#	PROJ	JOB	REV	TYPE	NAME	TYPE	NUMBER	DESCRIPTION
NO RELATED CONSTRUCTION JOBS FOUND								
						EF	202-1716C	ELECTRIC FACILITY MP
						UC	202-1716C	UNDERGROUND OPER MAP

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT

STANDARD CONSTRUCTION NOTES

SPECIFIC CONSTRUCTION NOTES

STAKED BY Customer

NO CONSTRUCTION NOTES FOUND

UNLESS OTHERWISE NOTED, ALL TERMINATIONS OF PRIMARY CONDUIT RUNS AND SECONDARY CONDUIT RUNS OTHER THAN 2" IN ABOVE GROUND PADS WILL BE MADE WITH 36" RADIUS 90 DEGREE BENDS. TERMINATIONS OF 2" SECONDARY CONDUIT RUNS IN ABOVE GROUND PADS WILL BE MADE WITH 24" RADIUS 90 DEGREE BENDS. ALL HORIZONTAL BENDS WILL BE MADE WITH 25' RADIUS SWEEPS, UNLESS OTHERWISE NOTED. STANDARD CONDUIT BENDS TO BE USED. THE MINIMUM TERMINATION FOR ANY SERVICE CONDUIT IS A 24" RADIUS 90 DEGREE BEND.

UNLESS OTHERWISE NOTED, IF SERVICES ARE NOT INSTALLED WITH THE MAIN SYSTEM, INSTALL CONDUIT STUBS FROM PADS AND HANDHOLES TO P/L. ALL STUBS REQUIRE CONDUIT STUB AND BALL MARKERS PER UG STANDARD 3377. SERVICE STUBS TO BE _____.

APPLICANT NOTES

IN THE EVENT OF CONFLICT BETWEEN THIS DRAWING AND THE GENERAL CONDITIONS, THE GENERAL CONDITIONS SHALL TAKE PRECEDENCE. A COMPLETE SET OF UTILITY CONSTRUCTION SPECIFICATIONS IS AVAILABLE ON REQUEST.

CHECK CONFLICTS IN AREA PRIOR TO ANY EXCAVATION. CALL 'USA' AT 1-800-422-4133 48 HOURS IN ADVANCE OF ANY GRADING OR EXCAVATION IN THE VICINITY OF SDGE FACILITIES. IT IS NECESSARY TO OBTAIN AN EXCAVATION PERMIT FROM THE LOCAL AUTHORITY.

AFTER NOTIFICATION THAT CONSTRUCTION CAN PROCEED, PHONE NOTIFICATION 48 HOURS PRIOR TO THE START OF CONSTRUCTION. MUST BE MADE TO THE CONSTRUCTION DEPARTMENT AT THE DISTRICT PHONE NUMBER INDICATED ON THE PREVIOUS PAGE.

FOR INSPECTION OF YOUR INSTALLATION AND ANY FIELD CHANGES PHONE SDGE INSPECTOR AT THE DISTRICT OPERATING CENTER.

PRECONSTRUCTION CONFERENCE WITH DISTRICT OPERATING DEPARTMENT REQUIRED.

TRENCH FOOTAGE - APPLICANT: Am SDGE: Ø

GAS WORK ORDER IS APPLICANT INSTALLATION. WO# _____

WORK ORDER: 2943780 PROJECT: 061621 JOB: 01 REV: 0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT

DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992

LOCATION	WRK F-C	MU ID	AU ID	DESCRIPTION	QTY RQD	UM	WORK RESP	MATL RESP	STANDARD PAGE
002	I-N		TR/C-P	PRIMARY CUSTOMER TRENCH	15	FT	C	C	3370.1
	I-N		SHD--C	SHADE TRENCH WITH SAND - CUSTOMER	15	FT	C	C	D7403
	I-N		1DB3-P	1-3 IN DB CONDUIT PRI	10	FT	C	C	3373.1
	I-N		1DB2-S	1-2 IN DB CONDUIT SEC	10	FT	C	C	3373.1
	I-N		1DB3-B	1-3 IN DB 90 D 36 IN R BEND PRI	1	EA	C	C	3373.2
	I-N		1DB2SB	1-2 IN DB 90 D 24 IN R BEND SEC	1	EA	C	C	3373.2
003	I-N		TR/C-S	SECONDARY CUSTOMER TRENCH	25	FT	C	C	
	I-N		SHD--C	SHADE TRENCH WITH SAND - CUSTOMER	25	FT	C	C	D7403
	I-N		1DB3-S	1-3 IN DB CONDUIT SEC	20	FT	C	C	3373.1
	I-N		1DB3SB	1-3 IN DB 90 D 36 IN R BEND SEC	1	EA	C	C	3373.2
005	R-N		3421-1	PAD 3421 1-PHASE TRANSFORMER	2	EA	C		3421.1
	R-N		3311-S	HANDHOLE 3311 66 IN	1	EA	C		3311
006	I-N		TR/C-S	SECONDARY CUSTOMER TRENCH	40	FT	C	C	
	I-N		SHD--C	SHADE TRENCH WITH SAND - CUSTOMER	40	FT	C	C	D7403
	I-N		1DB4-S	1-4 IN DB CONDUIT SEC	40	FT	C	C	3373.1
	I-N		1DB4SB	1-4 IN DB 90 D 36 IN R BEND SEC	1	EA	C	C	3373.2

WORK ORDER: 2943780 PROJECT: 061621 JOB: 01 REV: 0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
 DISTRICT: CM ADDRESS: 701-C 33RD ST SAN DIEGO 92102 PHONE: 699-1039 COST CENTER:
 DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATIONS: THROUGH:

MATERIAL TO BE PROVIDED BY CUSTOMER AND INSTALLED BY CUSTOMER

SHEET: 1

STOCK NUMBER	DESCRIPTION	ACCT STAT	ACCOUNT	QUANTITY REQUIRED	UM	ISSUED	CREDIT
249632	CONDUIT DB 2 IN 20 FT LENGTH	NE	366.00000	10	FT		
249664	CONDUIT DB 3 IN 20 FT LENGTH	NE	366.00000	30	FT		
249710	CONDUIT DB 100 4 IN 20 FT LENGTH	NE	366.00000	40	FT		
321984	BEND CONDUIT DB 2 IN 90 D 24 IN R	NE	366.00000	1	EA		
322048	BEND CONDUIT DB 3 IN 90 D 36 IN R	NE	366.00000	2	EA		
322082	4 IN DB 100 90 D 36 IN R BEND	NE	366.00000	1	EA		
X20042	PRI, SEC, & GAS ONLY TRENCH BY CUSTOMER	DC	366.00000	80	FT		

DP005DPS-REMOTE50-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 15

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: CEDAR & PACIFIC HWY ADDRESS: CITY: SD THOMAS BROTHERS: 1288-J2
DISTRICT: CM ADDRESS: 701-C 33RD ST SAN DIEGO 92102 PHONE: 699-1039 COST CENTER:
DESIGNED BY: JASON S SEILER PHONE: 636-3992 DATE ISSUED: _____
JOB COORD: STEVEN D KUSSMAN PHONE: 636-3918 PROJECT MGR: STEVEN D KUSSMAN PHONE: 636-3918

ONE-WAY TRAVEL HOURS: 0.5 YARD TIME: 1.2 TRAVEL YARD FACTOR: 0.3793

DP005DPS-REMOTE50-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 16

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 001 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 001 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
			M2033671700		RFS 200A CONNECTORS WITH (4) 3 WIRE RUNS. INSTALL TWO SETS OF 200A TEES AND A WHIP TO RE-CONFIGURE.

LOC 001 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED

AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 002 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 002 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY ROD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
I-N-S		TR/C-P	X20042	PRIMARY CUSTOMER TRENCH PRI, SEC, & GAS ONLY TRENCH BY CUSTOMER	15 15	FT FT		C	C	366.00000	3370.1		
I-N-S		SHD--C		SHADE TRENCH WITH SAND - CUSTOMER	15	FT		C		366.00000	D7403		
I-N-S		1DB3-P	249664	1-3 IN DB CONDUIT PRI CONDUIT DB 3 IN 20 FT LENGTH	10 10	FT FT		C	C	366.00000	3373.1		
I-N-S		1DB2-S	249632	1-2 IN DB CONDUIT SEC CONDUIT DB 2 IN 20 FT LENGTH	10 10	FT FT		C	C	366.00000	3373.1		
I-N-S		1DB3-B	322048	1-3 IN DB 90 D 36 IN R BEND PRI BEND CONDUIT DB 3 IN 90 D 36 IN R	1 1	EA EA		C	C	366.00000	3373.2		
I-N-S		1DB2SB	321984	1-2 IN DB 90 D 24 IN R BEND SEC BEND CONDUIT DB 2 IN 90 D 24 IN R	1 1	EA EA		C	C	366.00000	3373.2		

WORK FAC
FUNC CODE DESC EXIST TAG NEW TAG CONSTRUCTION NOTES

CUSTOMER TO INTERCEPT AND EXTEND 1-3" PRIMARY & 1-2" SECONDARY TO VAULT. 2" SECONDARY IS EMPTY.

LOC 002 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED

AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 003 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SELLER PHONE: 636-3992 LOCATION 003 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY ROD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
I-N-S		TR/C-S	X20042	SECONDARY CUSTOMER TRENCH PRI, SEC, & GAS ONLY TRENCH BY CUSTOMER	25	FT		C	C	366.00000			
I-N-S		SHD--C		SHADE TRENCH WITH SAND - CUSTOMER	25	FT		C		366.00000	D7403		
I-N-S		1DB3-S	249664	1-3 IN DB CONDUIT SEC CONDUIT DB 3 IN 20 FT LENGTH	20	FT		C	C	366.00000	3373.1		
I-N-S		1DB3SB	322048	1-3 IN DB 90 D 36 IN R BEND SEC BEND CONDUIT DB 3 IN 90 D 36 IN R	1	EA		C	C	366.00000	3373.2		

WORK FAC
FUNC CODE DESC EXIST TAG NEW TAG CONSTRUCTION NOTES

RE-FEED EXISTING 3312

LOC 003 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

DP005DPS-REMOTE50-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 19

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 004 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 004 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY ROD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FAC
FUNC CODE DESC EXIST TAG NEW TAG CONSTRUCTION NOTES
NO LOCATION CONSTRUCTION NOTES FOUND

LOC 004 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

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09/12/11 13:22

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DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 20

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 005 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 005 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
R-N-S		3421-1		PAD 3421 1-PHASE TRANSFORMER	2	EA		C		108.40000	3421.1		
R-N-S		3311-S		HANDHOLE 3311 66 IN	1	EA		C		108.40000	3311		

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
R	PD	PAD	D2031971708		NO LOCATION CONSTRUCTION NOTES FOUND
R	TO	1 PHASE XFRMER	179-93		

LOC 005 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 006 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 006 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
I-N-S		TR/C-S	X20042	SECONDARY CUSTOMER TRENCH PRI, SEC, & GAS ONLY TRENCH BY CUSTOMER	40	FT		C	C	366.00000			
I-N-S		SHD--C		SHADE TRENCH WITH SAND - CUSTOMER	40	FT		C		366.00000	D7403		
I-N-S		1DB4-S	249710	1-4 IN DB CONDUIT SEC CONDUIT DB 100 4 IN 20 FT LENGTH	40	FT		C	C	366.00000	3373.1		
I-N-S		1DB4SB	322082	1-4 IN DB 90 D 36 IN R BEND SEC 4 IN DB 100 90 D 36 IN R BEND	1	EA		C	C	366.00000	3373.2		

WORK FAC
FUNC CODE DESC EXIST TAG NEW TAG CONSTRUCTION NOTES
NO LOCATION CONSTRUCTION NOTES FOUND

LOC 006 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

DP005DPS-REMOTES0-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 007 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S. SELLER PHONE: 636-3992 LOCATION 007 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
			M100481		NO LOCATION CONSTRUCTION NOTES FOUND

LOC 007 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

DP005DPS-REMOTES0-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 23

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 008 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SELER PHONE: 636-3992 LOCATION 008 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
			U108939		NO LOCATION CONSTRUCTION NOTES FOUND

LOC 008 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED

AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

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09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 24

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 009 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 009 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	LNST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
I	TR	3 PHASE XFORMER	U108939	179-125	NO LOCATION CONSTRUCTION NOTES FOUND

LOC 009 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

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09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 25

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 010 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 010 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY ROD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
					CABLE TO FEED NEW 120/208 STATION.

LOC 010 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED

AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

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09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 26

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT

LOCATION: 011 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SELER PHONE: 636-3992 LOCATION 011 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
--------------	-------------	------	-----------	---------	--------------------

NO LOCATION CONSTRUCTION NOTES FOUND

LOC 011 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED

AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

DP005DPS-REMOTE50-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 27

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT

LOCATION: 012 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 012 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

WORK FUNC	FAC CODE	DESC	EXIST	TAG	NEW	TAG	CONSTRUCTION NOTES
I	TR	3 PHASE XFORMER			179-126		NO LOCATION CONSTRUCTION NOTES FOUND
			U108939				

LOC 012 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

DP005DPS-REMOTE50-001
09/12/11 13:22

SAN DIEGO GAS AND ELECTRIC
DPSS - CONSTRUCTION ORDER - CUSTOMER COPY

PAGE NO 28

WORK ORDER: 2943780 PROJECT: 061621 JOB:01 REV:0 TYPE: UD NAME: BAYSIDE FIRE DEPARTMENT RE-ARRG STATUS: ACT
LOCATION: 013 SHEET: 01 DISTRICT: CM DESIGNED BY: JASON S SEILER PHONE: 636-3992 LOCATION 013 OF 013

WRK F-C-T	MU ID	AU ID	STOCK#	DESCRIPTION/CONSTRUCTION NOTES	QTY RQD	UM	ACT QTY	WRK RSP	MAT RSP	ACCOUNT	STNDRD PAGE	INST/APP BY	DATE
				NO DESIGN UNITS FOR THIS LOCATION									

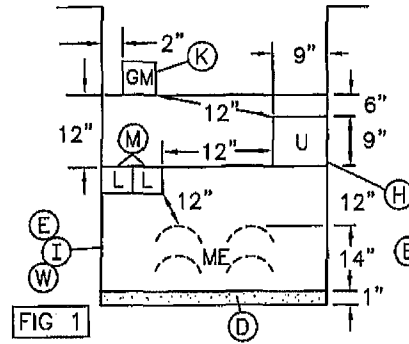
WORK FUNC	FAC CODE	DESC	EXIST TAG	NEW TAG	CONSTRUCTION NOTES
			D2034571697		LABOR TO DE-ENERGIZE AND GROUND AT THE FOLLOWING LOCATIONS: D2034571697 FUSE CABINET D2033871705 STATION D194769 STATION D146088 STATION

LOC 013 SHEET 01 COMPLETED PARTIALLY COMPLETED ENERGIZED

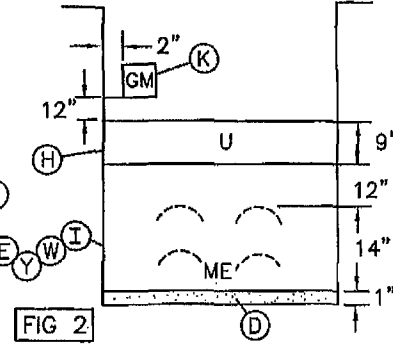
AS-BUILT RECORDED BY: _____ DATE: _____ MATERIAL CHECK BY: _____ DATE: _____

SCOPE: THIS STANDARD SHOWS TYPICAL PLACEMENT OF UTILITIES WITHIN TRENCHES FOR DISTRIBUTION AND SERVICE IN DEDICATED R/W (STREET) AND PRIVATE PROPERTY, AND PROVIDES THE MINIMUM DEPTH AND CLEARANCE THAT MUST BE MAINTAINED BETWEEN VARIOUS UTILITIES OCCUPYING THE SAME TRENCH IN SAN DIEGO COUNTY.

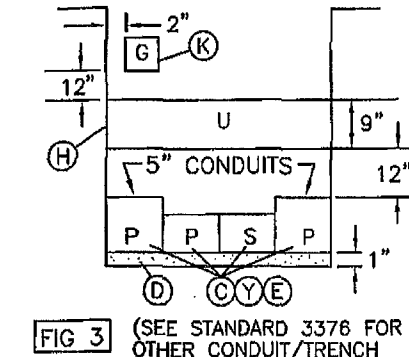
PROPERTY SIDE



PROPERTY SIDE

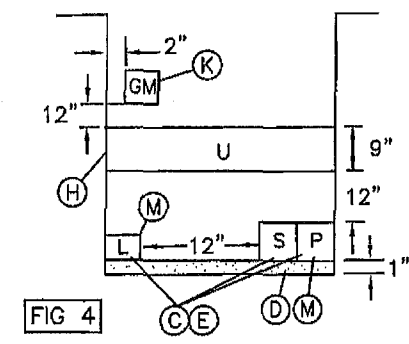


PROPERTY SIDE

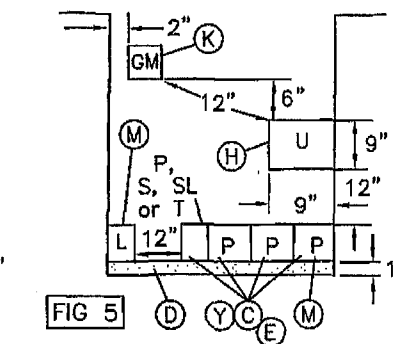


(SEE STANDARD 3376 FOR OTHER CONDUIT/TRENCH CONFIGURATIONS)

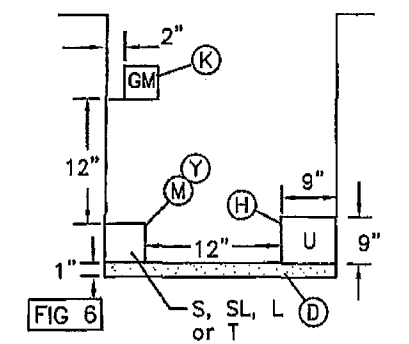
PROPERTY SIDE



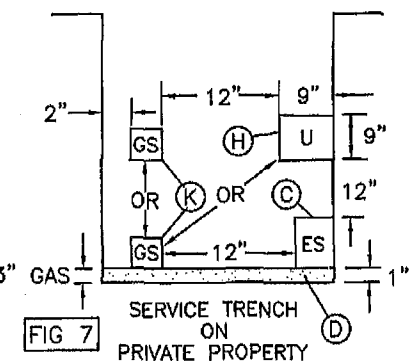
PROPERTY SIDE



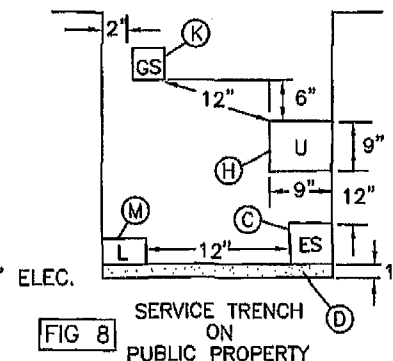
PROPERTY SIDE



PROPERTY SIDE



PROPERTY SIDE



LEGEND

GM	GAS MAIN
GS	GAS SERVICE
P	PRIMARY ELECTRIC
S	SECONDARY ELECTRIC
ES	ELECTRIC SERVICE
ME	MULTIPLE ELECTRIC (P OR S OR ES OR T, STACKED CONFIGURATION INCLUDING SPACERS AND 1-SACK CONCRETE SLURRY)
SL	SDG&E STREET LIGHT
L	FOREIGN UTILITY STREET LIGHT
U	FOREIGN UTILITY (TELCO, CATV)
T	SDG&E TELECOMMUNICATIONS

NOTES:

- DRAWINGS ARE NOT TO SCALE.
- SPACE ALLOTMENTS (OTHER THAN FOREIGN UTILITY) ARE 1/2 INCH LARGER THAN THE NOMINAL SIZE OF GAS MAIN, GAS SERVICE OR ELECTRIC CONDUIT. SEE INSTALLATION NOTE (H) FOR FOREIGN UTILITY SPACE ALLOTMENT.
- TYPICAL TRENCH SECTIONS ARE DESIGNED FOR INSTALLATIONS WHERE EACH OCCUPANT IS UTILIZING HIS ENTIRE SPACE ALLOTMENT. SIZE OF SPACE ALLOTMENTS MAY BE REDUCED OR ADDITIONAL ALLOTMENTS MAY BE ADDED PROVIDING MINIMUM COVER AND CLEARANCES ARE MAINTAINED AS LISTED ON PAGE 3370.2. ONLY ONE FOREIGN UTILITY SPACE ALLOTMENT FOR TELCO AND/OR CATV IS ALLOWED PER TRENCH. WIDTH AND DEPTH OF THE TRENCH MUST BE ADJUSTED ACCORDING TO SPACE ALLOTMENTS, MINIMUM CLEARANCES AND MINIMUM COVER.
- GAS PIPE REQUIRES A MINIMUM OF 12 INCHES RADIAL SEPARATION FROM ALL UTILITIES.

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SERVICE GUIDE	Indicates Latest Revision	Completely Revised	New Page	Information Removed	GAS STD. 7403.1
SDG&E ELECTRIC STANDARDS					REVISION
3370.1	UNDERGROUND DISTRIBUTION (UD) TRENCHES AND UTILITY POSITIONING - S.D. COUNTY				DATE 1-1-98 APPD [Signature]

THE FOLLOWING CHARTS SHOW THE MINIMUM COVER FOR EACH UTILITY, THE MINIMUM SEPARATION BETWEEN SPACE ALLOTMENTS AND THE MAXIMUM SIZE FOR EACH SPACE ALLOTMENT. TO READ THE CHARTS, READ ACROSS AND DOWN UNTIL THE TWO JOIN IN A SQUARE, AND THAT IS THE DISTANCE REQUIRED BETWEEN THE TWO UTILITIES.

EXAMPLE

		VERTICAL		HORIZONTAL		
		ES	GS			
ES	ELECTRIC SERVICE	—	⊙	12"		

UNDER VERTICAL, "ES" & "GS" JOIN AT ⊙ WHICH REFERS TO INSTALLATION NOTE ⊙.

UNDER HORIZONTAL, "ES" & "GS" JOIN AT 12 INCHES WHICH WOULD BE THE DISTANCE REQUIRED FROM THE OUTER EDGE OF THE ELECTRIC SERVICE (SPACE ALLOTMENT) TO THE OUTER EDGE OF GAS SERVICE (SPACE ALLOTMENT).

MAIN TRENCH, [SERVICE TRENCH PUBLIC PROPERTY] (MINIMUM SEPARATION FROM)

		VERTICAL								HORIZONTAL								*MIN. COVER	FACILITY SPACE ALLOTMENT (MAX)										
		GM GS	P	S	ES	SL	ME	L	U	GM GS	P	S	ES	SL	ME	L	U												
GM	GAS MAIN	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30" MIN 42" MAX	4-1/2"x4-1/2"		
GS	GAS SERVICE	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	42" MAX	4-1/2"x4-1/2"	
P	PRIMARY ELECTRIC	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30"	5-1/2"x5-1/2"	
S	SECONDARY ELECTRIC	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30"	5-1/2"x5-1/2"	
ES	ELECTRIC SERVICE	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30"	5-1/2"x5-1/2"	
SL	SDG&E STREET LIGHT	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30"	2-1/2"x2-1/2"	
ME	MULTIPLE ELECTRIC	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30"	18" x 14" (4 DUCTS)	
L	FOREIGN UTILITY STREET LIGHT	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	24"	2-1/2"x2-1/2"
U	FOREIGN UTILITY (TELCO, CATV)	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	24"	9" x 24"
T	SDG&E TELECOMMUNICATIONS	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	30"	4-1/2"x4-1/2"	

* ALL MINIMUM COVER DEPTHS MEASURED FROM FINAL GRADE. REDUCED DEPTHS IN NOTE ⊙ ARE LESSER DEPTHS THAN WHAT IS SHOWN UNDER "MINIMUM COVER".

⊙ NOT ALLOWED.

SERVICE TRENCH PRIVATE PROPERTY (MINIMUM SEPARATION FROM)

		VERTICAL					HORIZONTAL					*MIN. COVER	FACILITY SPACE ALLOTMENT (MAX)			
		GS	ES	ME	U	L	GS	ES	ME	U	L					
GS	GAS SERVICE	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	24" MIN 42" MAX	2-1/2" x 2-1/2"
ES	ELECTRIC SERVICE	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	24"	5-1/2" x 5-1/2"
ME	MULTIPLE ELECTRIC	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	24"	WILL VARY DUE TO BOARD AMPACITY
U	FOREIGN UTILITY TELCO, CATV	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	18"	9" x 9"
L	FOREIGN UTILITY STREET LIGHT	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	18"	2-1/2" x 2-1/2"

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GAS STD. 7403.2	Indicates Latest Revision	Completely Revised	New Page	Information Removed	SERVICE GUIDE
REVISION	SDG&E ELECTRIC STANDARDS				3370.2
DATE 1-1-96	UNDERGROUND DISTRIBUTION (UD) TRENCHES AND UTILITY POSITIONING - S.D. COUNTY				
APPD <i>[Signature]</i>					

INSTALLATION:

A. AN EFFORT SHOULD BE MADE TO KEEP THE TRENCH DEPTH LESS THAN 60 INCHES. IF A PERSON IS REQUIRED TO ENTER A TRENCH 60 INCHES OR DEEPER, IT SHALL BE SHORED, BENCHED, OR SLOPED TO PREVENT MOVEMENT OF EARTH THAT MAY ENDANGER LIFE OR PROPERTY. THE TRENCH CONFIGURATION, UTILITY POSITIONING AND ALL OTHER RELATED CONSTRUCTION MUST CONFORM TO THIS STANDARD AND THE STATE OF CALIFORNIA PUBLIC UTILITIES COMMISSION GENERAL ORDERS 128 AND 112D, AND ANY OTHER APPROPRIATE GOVERNMENTAL AGENCY HAVING JURISDICTION OVER CONSTRUCTION.

NOTE: BENCHING THE TRENCH IS FOR SAFETY REASONS ONLY AND NOT TO BE USED FOR INSTALLATION PURPOSES.

(B) THE TRENCH DEPTH IN THIS STANDARD SHALL BE FOLLOWED FOR ALL NORMAL INSTALLATIONS. IN INSTALLATIONS WHERE THE TRENCH DEPTH CANNOT BE MET, G.O. 128 REQUIRES ONE OF THE FOLLOWING: (1) STEEL, OR (2) SCHEDULE 40 PVC OR SCHEDULE 80 PVC CONDUIT WITH A MINIMUM WALL THICKNESS OF 0.15 INCHES, OR (3) A 3 INCH LAYER OF CONCRETE (2 SACK 3/8" ROCK) ABOVE AND 2 INCHES ON EACH SIDE OF THE CONDUIT. REDUCED DEPTHS MUST BE APPROVED BY BOTH THE CUSTOMER PROJECT PLANNER AND SDG&E INSPECTOR.

(C) ANY CONDUIT COMBINATION SMALLER THAN 5 INCH, (NOT MULTIPLE ELECTRIC—ME OR SERVICE CONDUITS) ARE PERMITTED WITHOUT SEPARATION WHEN INSTALLED IN A HORIZONTAL CONFIGURATION. SDG&E TELECOMMUNICATIONS SPACE ALLOTMENT IS PERMITTED NEXT TO THE ELECTRIC SPACE ALLOTMENTS WITHOUT SEPARATION. (6 INCH MINIMUM TRENCH WIDTH, 24 INCH MAXIMUM TRENCH WIDTH) (SEE STANDARD 3376 FOR CONDUIT/TRENCH CONFIGURATION).

(D) BASE AND SHADING MATERIAL FOR GAS TRENCH ONLY:
 IMPORTED MATERIAL CONSISTING OF NATURAL SAND OR MANUFACTURED SAND, EXISTING NATIVE MATERIAL, OR COMBINATIONS MAY BE USED FOR BASE AND SHADING MATERIAL PROVIDED IT COMPLIES WITH GAS STANDARD G7405 AND IS OF A QUALITY THAT WILL COMPLY WITH COMPACTION REQUIREMENTS OF GOVERNMENTAL AGENCIES. STANDARD G7405 SPECIFIES THAT THE MATERIAL MUST HAVE A MIXTURE OF PARTICLE SIZES ALL SMALLER THAN 1/2 INCHES. EXISTING NATIVE MATERIAL AND IMPORTED MATERIAL PROVIDED BY A DEVELOPER DOES NOT HAVE TO BE TESTED BY AN INDEPENDENT PROFESSIONAL TESTING FIRM IF, IN THE OPINION OF THE INSPECTOR, IT MEETS THE G7405 SPECIFICATION.

SHADING MATERIAL FOR ELECTRIC TRENCH ONLY: ELECTRIC SHADING MATERIAL (ESM) SPECIFICATION.
 ACCEPTABLE MATERIAL FOR (DB) DIRECT BURIED CONDUITS.
 NATURAL SAND, MANUFACTURED SAND, DECOMPOSED GRANITE, ROCK FREE SANDY LOAM, EXISTING NATIVE MATERIAL OR COMBINATION THEREOF. AGGREGATE COMPOSITION SHALL BE CAPABLE OF PASSING THROUGH A 1/2 INCH SIEVE. GRAVELS SHALL NOT AMOUNT TO MORE THAN 50% OF THE MIXTURE. SCREENING OR OTHER SUITABLE MEANS MAY BE REQUIRED AT THE DISCRETION OF THE SDG&E INSPECTOR TO MEET THIS (ESM) SHADING MATERIAL SPECIFICATION. NOT ACCEPTABLE ARE SOILS OF HIGHLY ORGANIC CONTENT IDENTIFIED BY ODOR OR SPONGY FEEL AND HIGHLY PLASTIC (SOGGY) CLAYS, SILTS OR METALLIC SLAG.

BASE AND SHADING MATERIAL FOR JOINT GAS AND ELECTRIC TRENCH:
 WHEN BOTH GAS AND ELECTRIC ARE INSTALLED IN THE SAME TRENCH, THE BASE AND SHADING MATERIAL WHICH COMPLIES WITH GAS STANDARD G7405 SHALL BE USED FOR THE GAS PIPE. ELECTRIC SHADING MATERIAL (ESM) MAY BE USED FOR SHADING MATERIAL ON ELECTRIC CONDUIT.

BACKFILL MATERIAL FOR GAS AND/OR ELECTRIC:
 THE MATERIAL USED FOR BACKFILLING THE TRENCH ABOVE THE SHADING MATERIAL AND EXTENDING UPWARD TO THE SUBGRADE SHALL BE FREE OF ROCKS OR CLODS LARGER THAN 6 INCHES IN ANY DIMENSION. THE COARSE MATERIAL SHALL BE WELL DISTRIBUTED THROUGHOUT THE FINER MATERIAL. THE AMOUNT OF ROCKS OR CLODS SHALL BE LIMITED, IN THE OPINION OF THE INSPECTOR, TO ALLOW FOR BAR TESTING FOR GAS LEAKS. THE BACKFILL MATERIAL SHALL MEET THE REQUIREMENTS OF ALL APPLICABLE CODES, ORDINANCES AND SDG&E STANDARDS AND BE FREE OF DEBRIS AND ORGANIC MATTER. 1-SACK CONCRETE SLURRY MIX MAY BE USED FOR FOR BACKFILL MATERIAL IF THE PIPE GAS IS SHADED WITH A MINIMUM OF 4 INCHES OF COMPACTED SHADING MATERIAL. 1-SACK CONCRETE SLURRY MIX IS PREFERRED FOR BACKFILL. THE SLURRY INSTALLATION SHALL MEET MEET THE REQUIREMENTS OF GOVERNMENTAL AGENCIES AND SDG&E STANDARDS.

BASE INSTALLATION FOR GAS:
 FOR GAS, 3 INCHES OF BASE MATERIAL IS REQUIRED ON THE BOTTOM OF THE TRENCH TO PREVENT DAMAGE FROM ROCKS, SAGS, OR POCKETS.

EARTH TRENCH BOTTOM INSTALLATION FOR ELECTRIC: (EB & DB CONDUIT)
 THE 1 INCH EARTH TRENCH BOTTOM SHALL BE STABLE WITH A UNIFORM GRADE CONTAINING NO HARD CLODS, ROCKS, ETC. THAT MAY DAMAGE THE CONDUIT. IF, IN THE OPINION OF THE SDG&E INSPECTOR, THE CONDUIT MAY BE DAMAGED, TAMPING, WETTING OR A 3 INCH BASE ELECTRIC SHADING MATERIAL (ESM) MAY BE REQUIRED.

SHADING INSTALLATION:
 A MINIMUM COVER OF 4 INCHES OF COMPACTED SHADING MATERIAL (4 INCHES AFTER COMPACTION) SHALL BE REQUIRED ABOVE THE GAS PIPE AND ELECTRIC CONDUIT. A MINIMUM COVER OF 12 INCHES OF COMPACTED SHADING MATERIAL WILL BE REQUIRED IF, IN THE OPINION OF THE INSPECTOR, THERE IS AN EXCESSIVE AMOUNT OF ROCK AND CLODS IN THE BACKFILL. THE SHADING MATERIAL MUST BE INSTALLED AND COMPACTED AT EACH LEVEL BEFORE INSTALLING THE NEXT UTILITY. THE SHADING MATERIAL MUST BE INSTALLED BEFORE THE TRENCH IS BACKFILLED TO PREVENT DAMAGE FROM ROCKS, CLODS, ETC. GAS PIPE SHALL NEVER BE CONCRETE OR SLURRY ENCASED, AND SHALL HAVE THE PROPER BASE, SHADING, BACKFILL, AND COMPACTION.

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SERVICE GUIDE	Indicates Latest Revision	Completely Revised	New Page	Information Removed	GAS STD. D7403.3
3370.3	SDG&E ELECTRIC STANDARDS				REVISION
	UNDERGROUND DISTRIBUTION (UD) TRENCHES AND UTILITY POSITIONING - S.D. COUNTY				DATE 3-1-02 APPD [Signature]

COMPACTION:

EXTREME CARE SHALL BE TAKEN TO ENSURE THAT SHADING MATERIAL IS ADEQUATELY COMPACTED BOTH UNDERNEATH AND AROUND GAS PIPE AND FITTINGS TO PREVENT EXCESSIVE STRESS AND SHEARING FORCES. HAND TEMP AROUND FITTINGS WHERE MECHANICAL COMPACTION CANNOT BE USED. COMPACTION WITH A HYDRAHAMMER OR SIMILAR EQUIPMENT SHALL NOT BE ALLOWED ON TRENCHES WHERE POLYETHYLENE PIPE HAS BEEN INSTALLED. WHEN THE SHEEP'S FOOT METHOD OF COMPACTION IS USED, A MINIMUM OF 18" OF COVER IS REQUIRED BEFORE COMPACTION. WHEEL ROLLING WITH A HEAVY VEHICLE, COMBINED WITH ADEQUATE MECHANICAL COMPACTION, IF NEEDED, IS ALLOWED FOR COMPACTION BACKFILL MATERIAL PROVIDED A MINIMUM OF 4 INCHES OF MECHANICALLY COMPACTED SHADE MATERIAL AND A MINIMUM OF 12" OF BACKFILL MATERIAL EXISTS OVER THE GAS PIPE OR ELECTRICAL CONDUIT. WHEN FLOODING OF THE TRENCH IS DONE TO CONSOLIDATE BACKFILL, CARE MUST BE TAKEN TO ENSURE THAT GAS PIPE OR ELECTRIC CONDUIT HAS NOT FLOATED FROM ITS POSITION IN THE TRENCH. COMPACTION BY THE WATER JETTING METHOD IS NOT ALLOWED. SHADING AND BACKFILL SHALL BE COMPACTED IN ACCORDANCE WITH GOVERNMENTAL AGENCIES AND SHALL HAVE A MINIMUM OF 90 PERCENT RELATIVE COMPACTION.

ALL BASE, SHADING, AND BACKFILL MATERIAL MUST BE APPROVED BY AN SDG&E INSPECTOR.

- (E) ONE OR MORE 5 INCH PRIMARY CONDUITS SHALL BE SLURRY ENCASED.
- (F) FOREIGN UTILITIES MUST NOT BE LOCATED UNDER ANY SDG&E FACILITIES, SUCH AS HANDHOLES, TRANSFORMER PADS, ETC.

(G) MINIMUM TRENCH WIDTH

	UTILITY	PIPE/CONDUIT SIZE	MINIMUM WIDTH
GAS	SINGLE GAS -- SERVICE	1 INCH AND LESS	6 INCHES
	SINGLE GAS	2 INCH	9 INCHES
	SINGLE GAS	3 AND 4 INCHES	12 INCHES
	SINGLE GAS	6 AND 8 INCHES	18 INCHES
ELECT. MAIN TRENCH	ALL CONDUIT SIZES INCLUDING 2 - 5 INCHES		
	ELECTRIC	ALL SIZES	6 INCHES
	JOINT UTILITIES	ALL PERMITTED SIZES (6 AND 8 INCH GAS)	12 INCHES
	MULTIPLE ELECTRIC	SPACERS AND 1-SACK CONCRETE SLURRY	9 INCHES
ELECT. SERVICE TRENCH	SINGLE ELECT.	2 INCH CONDUIT	6 INCHES
	SINGLE ELECTRIC & FOREIGN UTILITIES (EXCLUDING GAS)	2 INCH CONDUIT	6 INCHES
	ELECTRIC	ALL SIZES	9 INCHES
	SINGLE ELECTRIC & FOREIGN UTILITIES (EXCLUDING GAS)	LARGER THAN 2 INCH	12 INCHES
	JOINT UTILITIES	ALL PERMITTED SIZES	12 INCHES
	MULTIPLE ELECTRIC	SPACERS AND 1-SACK CONCRETE SLURRY	9 INCHES

FOR A GAS OR ELECTRIC SERVICE, IF ANY OBSTRUCTION IS ENCOUNTERED (WATER PIPES, ETC.), A 2 FOOT WIDE X 3 FOOT LONG HOLE MAY BE REQUIRED FOR WORKING ROOM IN THE AREA OF THE OBSTRUCTION. THIS IS TO BE DETERMINED BY AN SDG&E INSPECTOR.

- (H) THE FOREIGN UTILITY (U) SPACE ALLOTMENT MUST BE A MINIMUM OF 6 INCHES BELOW THE GAS MAIN AND 12 INCH RADIAL SEPARATION FROM ALL OTHER UTILITIES MUST BE MAINTAINED (SEE FIGURES 1 AND 5). IF (U) SPACE ALLOTMENT EXCEEDS A 9 INCH HORIZONTAL MEASUREMENT, IT MUST BE PLACED DIRECTLY ABOVE THE ELECTRIC SPACE ALLOTMENTS AND SHALL NOT EXTEND PAST THE OUTER SIDES OF ELECTRIC SPACE ALLOTMENTS. (FOR INSTALLATION PURPOSES, BENCHING THE TRENCH IS NOT ALLOWED), SEE FIGURES 2, 3, & 4. IF (U) SPACE ALLOTMENT IS 9" X 9" OR SMALLER, IT IS ALLOWED AT THE SAME LEVEL AS THE ELECTRIC (SEE FIGURE 6).
- (I) ALL EB CONDUIT, REGARDLESS OF THE SIZE, SHALL BE CONCRETE ENCASED WITH 1-SACK CEMENT SLURRY. DB CONDUIT MAY ALSO BE SLURRY ENCASED IF INCLUDED IN THE MULTIPLE ELECTRIC PACKAGE. IN A SERVICE TRENCH, ALL EB CONDUIT SHALL BE ENCASED WITH CEMENT SLURRY (1 SACK). DB CONDUIT MAY ALSO BE CONCRETE OR SLURRY ENCASED IF INCLUDED IN THE MULTIPLE ELECTRIC PACKAGE.

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GAS STD. 7403.4	Indicates Latest Revision	Completely Revised	New Page	Information Removed	SERVICE GUIDE
REVISION	SDG&E ELECTRIC STANDARDS				3370.4
DATE 1-1-2000	UNDERGROUND DISTRIBUTION (UD) TRENCHES				
APPD <i>[Signature]</i>	AND UTILITY POSITIONING - S.D. COUNTY				

J MINIMUM SEPARATION MAIN TRENCH

UTILITY

TELCO MULTIPLE CONCRETE DUCT (CONDEX), TRANSITE, WATER, SEWER, FUEL, OIL, DIESEL, PROPANE GAS, SPRINKLER, DRAIN, LEACH LINES, STEEL GAS MAIN LARGER THAN 2", PRIVATELY OWNED UTILITIES i.e. PRIVATE TELCO, VIDEO, AUDIO, SECURITY WIRES, FIRE ALARM, STREET LIGHTING, ETC..

WATER, SEWER, EXISTING GAS OR ELECTRIC, STORM DRAINS, STEAM, IRRIGATION PIPE, SPRINKLER PIPE LARGER THAN 4", PRIVATE TELCO TRANSITE, PROPANE GAS

SEWAGE LEACH LINES OR SEEPAGE PITS

IRRIGATION, SPRINKLER PIPE 4" AND LESS

FUEL OIL, GASOLINE, DIESEL

IN CONSIDERATION FOR THE SAFETY OF THE GENERAL PUBLIC, PERSONS ENGAGED IN CONSTRUCTION, PROPERTY, AND FOR THE OPERATION AND MAINTENANCE OF SDG&E SYSTEM, PROPANE GAS LINES ARE NOT PERMITTED IN A JOINT TRENCH WITH SDG&E FACILITIES.

* IF FIELD CONDITIONS WILL NOT PERMIT ANY OF THESE SEPARATIONS, THEN APPROVAL OF REDUCED SEPARATIONS MUST COME FROM BOTH THE CUSTOMER PROJECT PLANNER AND SDG&E INSPECTOR. ON FIELD CONDITIONS THAT WILL NOT PERMIT STANDARD PARALLEL SEPARATIONS, A 12 INCH MINIMUM SEPARATION IS REQUIRED. PROPANE GAS SHALL ALWAYS HAVE A 5 FOOT SEPARATION.

HORIZONTAL SEPARATION

NOT PERMITTED IN JOINT TRENCH WITH GAS AND/OR ELECTRIC

* 5 FEET WITH 3 FEET OF UNDISTURBED SOIL

5 FEET FROM MAIN TRENCH FOR EACH 1' DEPTH OF MAIN TRENCH

* 3 FEET PROVIDED DEPTH OF PIPE DOES NOT EXCEED DEPTH OF GAS OR ELECTRIC

FROM GAS-15 FEET, FROM ELECT.-5 FEET WITH 3 FEET OF UNDISTURBED SOIL

UTILITY

ALL WET UTILITIES, TELCO, TV, GAS, ELECT.

FUEL OIL, GASOLINE, DIESEL

ARC-WELDABLE PIPELINES 3" AND LARGER

STEAM
(SEE NOTE)

VERTICAL (CROSSING) SEPARATION MIN.

6 INCHES

FROM GAS, 12 INCHES
FROM ELECT. 6 INCHES

18 INCHES

FROM GAS, POLY PIPE 5 FEET
FROM ELECT., 5 FEET

NOTE: PLACE INSULATING BARRIER BETWEEN STEAM MAIN AND POLYETHYLENE PIPE AND/OR ELECTRIC.

MINIMUM SEPARATION SERVICE TRENCH

IN A SERVICE TRENCH, WATER, SEWER, PROPANE GAS, SPRINKLER, DRAIN, LEACH LINES, PRIVATELY OWNED UTILITIES i.e., PRIVATE TELCO, VIDEO, AUDIO, SECURITY WIRES, FIRE ALARM, STREET LIGHTING, ETC., ARE NOT PERMITTED IN THE SAME TRENCH WITH GAS OR ELECTRIC. WHEN THESE FACILITIES PARALLEL GAS OR ELECTRIC, 12 INCHES SEPARATION BETWEEN SEPARATE TRENCHES SHALL BE MAINTAINED BETWEEN THE UTILITIES WITH AT LEAST 12 INCHES OF UNDISTURBED NATIVE SOIL BETWEEN TRENCHES. PROPANE GAS SHALL ALWAYS HAVE A 5 FOOT SEPARATION. WHEN CROSSING, A 6 INCH VERTICAL SEPARATION IS REQUIRED.

(EXCEPTION) WHEN THERE IS NO SDG&E GAS IN THE SERVICE TRENCH, A SINGLE NATURAL GAS LINE MAY BE INSTALLED IN THE TRENCH, PROVIDED A 12 INCH RADIAL SEPARATION IS MAINTAINED. (THIS IS FOR AN INDIVIDUAL HOUSE ON A CASE BY CASE BASIS, NOT A GROUP OF HOUSES/BUILDINGS).

FUEL OIL, GASOLINE, AND DIESEL LINES MUST MAINTAIN A 15 FOOT SEPARATION FROM GAS PIPELINES AND A FIVE FOOT SEPARATION WITH THREE FEET OF UNDISTURBED SOIL SEPARATION FROM ELECTRIC CONDUITS.

IF FIELD CONDITIONS WILL NOT PERMIT THESE SEPARATIONS, THEN APPROVAL OF REDUCED SEPARATIONS MUST COME FROM BOTH THE CUSTOMER PROJECT PLANNER AND SDG&E INSPECTOR.

WHEN FIELD CONDITIONS WILL NOT PERMIT STANDARD PARALLEL SEPARATIONS, A 12 INCH MINIMUM SEPARATION IS REQUIRED. PROPANE GAS SHALL ALWAYS HAVE A 5 FOOT SEPARATION.

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- (K) THE GAS MAIN SHALL BE THE LAST INSTALLED, SHALL BE ON THE PROPERTY SIDE OF THE TRENCH, AND SHALL HAVE A MINIMUM OF INCH PAD (AFTER COMPACTION) OF SHADING MATERIAL THE WIDTH OF THE TRENCH ABOVE ANY FOREIGN UTILITY. ANY CROSSING INVOLVING GAS SHALL MAINTAIN A MINIMUM VERTICAL SEPARATION OF 6 INCHES. A GAS SERVICE INSTALLED IN A MAIN TRENCH OR A SERVICE TRENCH ON PUBLIC PROPERTY SHALL REQUIRE THE SAME COVER AND CLEARANCES AS A GAS MAIN. A GAS SERVICE IN A TRENCH ON PRIVATE PROPERTY MAY BE INSTALLED ON THE SAME LEVEL AS FOREIGN UTILITY OR ELECTRIC, BUT SHALL NOT BE DEEPER THAN THE ELECTRIC SERVICE. SDG&E INSPECTOR IS TO DETERMINE AT WHICH LEVEL THE GAS SERVICE IS INSTALLED ON PRIVATE PROPERTY.
- (L) SDG&E INSTALLED STREET LIGHT CIRCUITS, WHEN INSTALLED ALONE IN A TRENCH, SHALL BE AT A MINIMUM DEPTH OF 24 INCHES EVERYWHERE EXCEPT ON PRIVATE PROPERTY, WHERE THE MINIMUM MAY BE 18 INCHES BELOW FINAL GRADE.
- (M) THE ELECTRIC PRIMARY WILL BE ON THE STREET SIDE OF THE TRENCH. THE SDG&E STREET LIGHT CIRCUITS WILL BE ON THE PROPERTY SIDE OF THE TRENCH WHENEVER POSSIBLE. FOREIGN UTILITY STREET LIGHTS (NOT SERIES) SHALL BE ON THE PROPERTY SIDE OF THE TRENCH AT THE SAME LEVEL AS SDG&E CONDUITS AND SHALL MAINTAIN A 12 INCH RADIAL SEPARATION. ALL UTILITIES SHALL MAINTAIN A 6 INCH SEPARATION WHEN CROSSING ALL SDG&E ELECTRIC. FOR SEPARATION ON THE SERVICE TRENCH, SEE CHART ON PAGE 7403.2 (3370.2).
- (N) MINIMUM HORIZONTAL SEPARATION FROM GAS PIPE TO ANY FOREIGN SUBSTRUCTURE (VAULTS, HANDHOLES, ETC.) SHALL BE 12 INCHES.
- (O) GAS LINES MUST NOT BE LOCATED UNDER ANY STRUCTURE, SUCH AS BUILDINGS, CARPORTS, PATIOS, BREEZEWAYS, EQUIPMENT PADS, AND FACILITIES, SUCH AS SPLICE BOXES FOR ELECTRIC, CATV, TELCO, ETC. TREES OR SHRUBBERY MUST NOT BE PLANTED OVER ANY GAS PIPELINE. A THREE FOOT SEPARATION MUST BE MAINTAINED BETWEEN THE TREE ROOT BALL AND THE GAS PIPELINE.
- (P) IF AN AGENCY OR UTILITY SUCH AS THE U.S. GOVERNMENT, SAN DIEGO UNIFIED PORT DISTRICT, TELCO, CATV, ETC. REQUIRES CONCRETE ENCASEMENT, CONCRETE MAY BE SUBSTITUTED FOR THE BACKFILL. BASE & SHADING SHALL BE PER SDG&E STANDARDS. ON SDG&E CONDUITS, EITHER DIRECT BURIED OR CONCRETE ENCASED, A MINIMUM INCH COMPACTED SHADING MATERIAL SHALL BE INSTALLED OVER THE UPPERMOST DB CONDUITS BEFORE THE CONCRETE BACKFILL IS INSTALLED. ALL OTHER INSTALLATIONS SHALL PROVIDE THE REQUIRED MATERIALS AS SPECIFIED IN THIS STANDARD AND STANDARDS 3365 & 3376. NOTE: THE GAS MAIN, GAS SERVICE SHALL NEVER BE CONCRETE OR SLURRY ENCASED AND SHALL HAVE THE PROPER BASE, SHADING, BACKFILL, AND COMPACTION.
- Q. MINIMUM SEPARATION OF ANY FOREIGN UTILITY INCLUDING WATER PIPES, SEWER, ETC., FROM SDG&E SUBSTRUCTURES SHALL BE 12 INCHES. PROPANE GAS SHALL BE 5 FEET.

REFERENCE:

- (R) SEE STANDARD PAGE 3364.1 FOR UTILITY LOCATIONS IN LOCAL AND COLLECTOR STREETS.
- S. SEE STANDARD PAGE 3364.2 FOR UTILITY LOCATIONS IN MAJOR STREETS, PRIME ARTERIALS AND EXPRESSWAYS.
- T. SEE STANDARD PAGE 3364.3 FOR JOINT TRENCH TYPICAL LOCATION FOR UNDERGROUND CONVERSIONS.
- (U) SEE STANDARD PAGE 3365 FOR IMPORTED OR NATIVE BACKFILL MATERIAL.
- (V) SEE STANDARD PAGE 3365 FOR SLURRY BACKFILL MATERIAL.
- (W) CONCRETE OR CONCRETE SLURRY ENCASEMENT OF ELECTRIC CONDUITS SHALL BE IN ACCORDANCE WITH STANDARD 3376.
- X. SEE STANDARD PAGE 3376, 3421, 3425, 3426, AND 3427 FOR CONDUIT CONFIGURATIONS ALLOWED IN THE SERVICE TRENCH.
- (Y) SEE STANDARD 4620 TELECOMMUNICATIONS INSTALLATION.
- Z. FOR TRENCHING AND SHORING QUESTIONS, SEE SDG&E TRENCHING AND SHORING MANUAL.

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REVISION	SDG&E ELECTRIC STANDARDS				
DATE 1-1-2000 APPD <i>[Signature]</i>	UNDERGROUND DISTRIBUTION (UD) TRENCHES AND UTILITY POSITIONING - S.D. COUNTY				3370.6

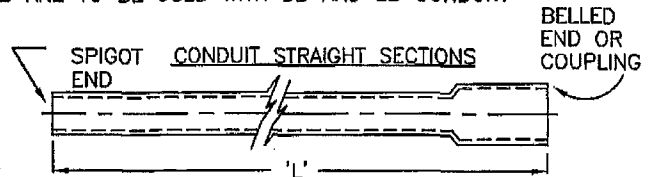
SCOPE: THIS STANDARD SHOWS THE CONDUIT AND FITTINGS USED TO CONSTRUCT UNDERGROUND CONDUIT SYSTEMS. CONDUIT AND FITTINGS IN THIS STANDARD SHALL BE USED IN BELOW-GROUND OR BRIDGE CELL APPLICATIONS.

NOTES:

(PVC) POLYVINYLCHLORIDE CONDUIT

- PVC CONDUIT SHALL BE GRAY OR BLACK IN COLOR. NO OTHER COLOR IS ACCEPTABLE FOR SDG&E CONDUIT SYSTEM.
- FOR SCHEDULE 40 AND SCHEDULE 80 ABOVE-GROUND COMPONENTS TO CONSTRUCT CABLE POLE RISERS, SEE UNDERGROUND STANDARD 4204.
- ALL 5" CONDUIT MUST BE ENCASED WITH CONCRETE SLURRY. (1-SACK MIX).
- DB CONDUIT IS REQUIRED FOR INSTALLATIONS REQUIRING DIRECT BURIED MATERIAL, i.e. SAND, DECOMPOSED GRANITE (DG), NATIVE, ETC.
- FOR DIRECT BURIED INSTALLATIONS, DB 60 IS REQUIRED FOR 2", 3" & 5" CONDUIT. DB 100 IS REQUIRED FOR 4" CONDUIT.
- ALL COUPLINGS, BENDS AND SWEEPS CLASSIFIED AS DB ARE TO BE USED WITH DB AND EB CONDUIT.
- DB = DIRECT BURIED CONDUIT.
- EB = ENCASED BURIED CONDUIT.
- THE SHELF LIFE FOR DB CONDUIT, BENDS, AND FITTINGS EXPOSED TO SUNLIGHT IS 6 MONTHS MAXIMUM. 2-#8 FROM A RISER POLE TO THE FIRST LOCATION SHALL BE INSTALLED IN 2" CONDUIT.

** - SCHEDULE 40 CONDUIT IS REQUIRED IN BRIDGE CELLS.



CONDUIT SIZE	TYPE	LENGTH 'L'	STOCK NUMBER	ASSEMBLY UNITS		
				1-SACK ENCASE W/SPACERS	PRIMARY	SEC/SERV
2"	DB 60	20'	249632	1EB2IN	1DB2-P	1DB2-S
3"	DB 60	20'	249664	1EB3IN	1DB3-P	1DB3-S
4"	DB 100	20'	249710	1EB4IN	1DB4-P	1DB4-S
5"	DB 60	20'	249728	1, 2DB5SL	-	1DB5-S
	** SCH40	10'	251408	-	S40-5"	S40-5"

(PE) POLYETHYLENE CONDUIT

CONDUIT SIZE	TYPE	COIL LENGTH	STOCK NUMBER	ASSEMBLY UNIT
1"	SDR 9	2000'	249630	1" PE
2"	SCH 40	2500'	252002	-
3"	SCH 40	1000'	252004	-
4"	SDR 15.5	500'	252006	-
5"	SCH 80	20' LENGTHS	252008	-

NOTES:

POLYETHYLENE CONDUIT SHALL BE BLACK OR BLACK WITH THREE EQUALLY SPACED RED STRIPS. NO OTHER COLOR IS ACCEPTABLE FOR THE SDG&E CONDUIT SYSTEM.

CORRUGATED POLYETHYLENE CONDUIT IS NOT ACCEPTABLE FOR THE SDG&E CONDUIT SYSTEM.

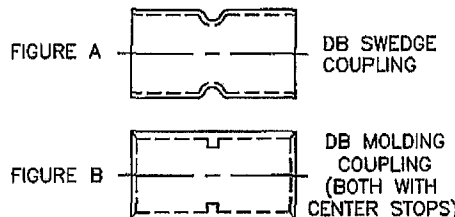
REFERENCE:

SEE STANDARD 3383 FOR SPLICING OR REPAIRING 1" POLYETHYLENE CONDUIT.

NOTES: ***

S/N 280384 SCH 40 PVC MAY BE USED AS A REPLACEMENT ON A TEMPORARY BASIS. (DEPENDS ON SUPPLIER OF COUPLING).

CONDUIT COUPLINGS



FIGURES A & B	
COUPLING CONDUIT SIZE	DB OR EB STOCK NUMBER
2"***	279872
3"	279904
4"	279936
5"	280032

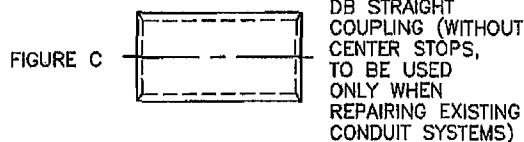
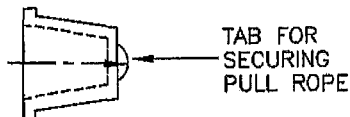


FIGURE C	
COUPLING CONDUIT SIZE	DB OR EB STOCK NUMBER
2"	-
3"	279920
4"	279952
5"	280064

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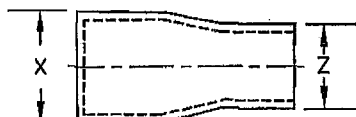
SERVICE GUIDE	<input checked="" type="checkbox"/> Indicates Latest Revision	<input type="checkbox"/> Completely Revised	<input type="checkbox"/> New Page	<input type="checkbox"/> Information Removed
REVISION	SDG&E ELECTRIC STANDARDS			3373.1
DATE 8-10-04	CONDUIT AND CONDUIT FITTINGS			
APPD TR / JW				

CONDUIT PLUG



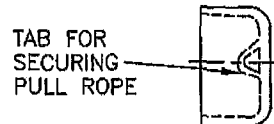
CONDUIT SIZE	STOCK NUMBER	ASSEMBLY UNITS
2"	544768	PLUG-2
3"	544800	PLUG-3
4"	544704	PLUG-4
5"	544736	PLUG-5

CONDUIT BELL REDUCER



CONDUIT SIZE X TO Z	STOCK NUMBER	ASSEMBLY UNITS
3"-2"	573376	RED3-2
4"-3"	573380	RED4-3
5"-4"	573384	RED5-4

CONDUIT END CAP

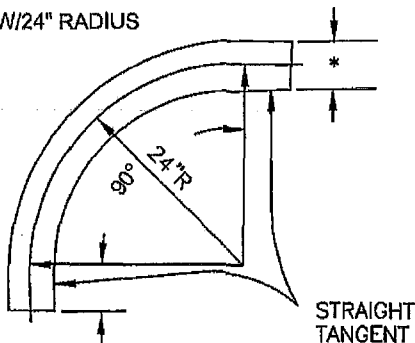


CONDUIT SIZE	STOCK NUMBER	ASSEMBLY UNITS
2"	203296	CAP-02
3"	203328	CAP-03
4"	203360	CAP-04
5"	203392	CAP-05

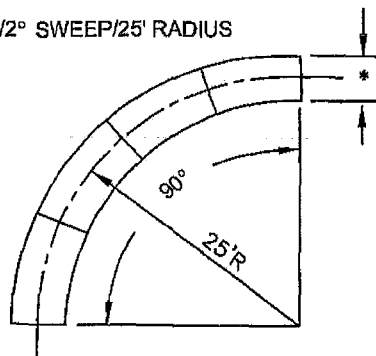
CONDUIT BENDS

(EXAMPLES)

90° ELBOW/24" RADIUS



22-1/2° SWEEP/25' RADIUS



BILL OF MATERIAL:

* NOMINAL CONDUIT SIZE	DEGREE OF CURVATURE	RADIUS OF CURVATURE	TYPE OF CONDUIT	STOCK NUMBER	ASSEMBLY UNITS		
					CONCRETE ENCASE	PRIMARY	SEC/SERV
2"	22-1/2°	25'-0"	DB 60	321808	1EB2-S	1DB2PS	1DB2SS
	45°	24"(SECONDARY ONLY)	DB 60	321920	-	-	1DB2S8
	45°	36"	DB 60	321810	1EB2-8	1DB2-B	-
	90°	24"(SECONDARY ONLY)	DB 60	321984	-	-	1DB2SB
	90°	36"	DB 60	321812	1EB2-B	1DB2-B	-
3"	11-1/4°	25'-0"	DB 60	321876	1EB3-C	1DB3-C	1DB3SC
	22-1/2°	25'-0"	DB 60	322144	1EB3-S	1DB3PS	1DB3SS
	45°	36"	DB 60	321878	1EB3-8	1DB3-8	1DB3S8
	90°	36"	DB 60	322048	1EB3-B	1DB3-B	1DB3SB
4"	11-1/4°	25'-0"	DB 100	321884	1EB4-C	1DB4-C	1DB4SC
	22-1/2°	25'-0"	DB 100	321826	1EB4-S	1DB4PS	1DB4SS
	45°	36"	DB 100	321942	1EB4-8	1DB4-8	1DB4S8
	90°	36"	DB 100	322082	1EB4-B	1DB4-B	1DB4SB
5"	11-1/4°	25'-0"	DB 60	321882	1EB5-C	1DB4-C	1DB5SC
	22-1/2°	25'-0"	DB 60	321856	1EB5-S	1DB5PS	1DB5SS
	45°	36"	DB 60	321960	1EB5-8	1DB5-8	1DB5S8
	90°	36"	DB 60	322112	1EB5-B	1DB5-B	1DB5SB

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SERVICE GUIDE	<input checked="" type="checkbox"/> Indicates Latest Revision	<input type="checkbox"/> Completely Revised	<input type="checkbox"/> New Page	<input type="checkbox"/> Information Removed
3373.2	SDG&E ELECTRIC STANDARDS			REVISION
	CONDUIT AND CONDUIT FITTINGS ED AND DB			DATE 5-9-06 APPD JJ / MF

SCOPE: THIS STANDARD SHOWS FIELD MAPPING REQUIREMENTS OF ELECTRIC CONDUIT FOR THE PURPOSE OF CREATING AN ACCURATE AS-BUILT.

PREPARING AS-BUILTS

INTENT

THE INTENT OF PREPARING AN AS-BUILT IN THE FIELD IS TO OBTAIN THE NECESSARY DATA FOR RECORDING THE "TYPE," "SIZE," "AMOUNT," AND "POSITION" OF MATERIAL OR EQUIPMENT INSTALLED AND RECORD THE LOCATION OF THE FACILITIES FOR MAPPING BY THE MAPPING AND RECORDS SECTION.

INFORMATION TO BE OBTAINED FOR ELECTRIC UNDERGROUND

- | | |
|------------------|-------------------------------------|
| 1. TIE-DOWNS | 4. CONDUIT SIZE |
| 2. SOURCE | 5. FOOTAGES BY CONDUIT SIZE |
| 3. SUBSTRUCTURES | 6. TOTAL QUANTITIES OF SWEEPS/BENDS |

DATA COLLECTION VS. DRAFTING QUALITY

THE MAPMAKERS COPY NEED ONLY BE CLEAR AND LEGIBLE AND NOT OF DRAFTING QUALITY. THE PRIORITY PLACED ON FIELD AS-BUILT DRAWINGS SHOULD BE ON THE DATA COLLECTED SUCH AS MEASUREMENTS, QUANTITY, SIZE, ETC. IT IS THE RESPONSIBILITY OF THE MAPPING & RECORDS SECTION TO DRAFT THE FINAL MAP FOR PERMANENT RECORDS.

NOTE: IT IS THE RESPONSIBILITY OF THE CONSTRUCTION DEPARTMENTS AND CONSTRUCTION SERVICES TO PROVIDE FIELD AS-BUILT INFORMATION (I.E., MAPPERS, FOREMEN, ETC.).

IN THE EVENT AS-BUILTS REQUIRE ADDITIONAL INFORMATION, THEY WILL BE RETURNED TO THE PERSON ACCOUNTABLE FOR THE AS-BUILT. AS-BUILT MUST INCLUDE THE FOLLOWING TO BE ACCEPTED BY MAPPING & RECORDS.

WORK ORDER NUMBER, PERSON'S NAME WHO DID THE AS-BUILT, NAME OF CONTRACTOR IF DONE BY CONTRACTOR, DATE, AND NAME OF PERSON APPROVING AS-BUILT.

ALL REQUESTS FOR CONFIRMATION OF FIELD AS-BUILT DATA SHOULD BE RETURNED TO MAPPING & RECORDS WITHIN (10) WORKING DAYS.

NEW COMPANY STANDARD AND POLICY

A MAPPER'S PACKAGE IS TO BE PREPARED AND ISSUED ALONG WITH THE WORK ORDER FOR CONSTRUCTION. THE MAPPER'S PACKAGE SHALL CONTAIN THE FOLLOWING ITEMS:

- A. ONE "FULL-SIZE" COPY OF THE DESIGN DRAWING.
- B. ONE REDUCED COPY (IF APPLICABLE) OF THE DESIGN DRAWING.
- C. UG CONDUIT DISPATCH ORDER TO BE COMPLETED.
- D. BASEMAP PLOT. (OPTIONAL - NEEDED FOR LARGER JOB)

NOTE: THE ABOVE COPIES ARE FOR THE USE OF THE PERSON RESPONSIBLE FOR PREPARING THE FIELD AS BUILT. THESE COPIES ARE STAMPED AS SUCH NOT TO BE USED FOR OTHER PURPOSES.

ALL FIELD AS-BUILTS ARE TO BE CREATED USING ONE COPY FOR THE FULL SIZE OR REDUCED DESIGN DRAWING. RECORD, BY USE OF A GREEN COLORED PENCIL, THE NECESSARY DATA ONTO THE DESIGN DRAWING. USE THE GREEN PENCIL TO SCRATCH THROUGH DESIGN INFORMATION THAT DIFFERS FROM THE AS-BUILT INFORMATION. IF PRIMARY OR SERVICE CONDUIT HAS A LOCATION SUBSTANTIALLY DIFFERENT THAN INDICATED ON THE ORIGINAL DESIGN, LINE THROUGH THE ORIGINAL LOCATION AND DRAW IN THE APPROXIMATE AS-BUILT LOCATION. THIS FORMAT SHOULD BE USED ON ALL FIELD AS-BUILT DRAWINGS.

ALL DATA AND/OR CORRECTED INFORMATION AS TO SIZE, LENGTH, POSITION, OR QUANTITY IS TO BE TRANSFERRED FROM THE DESIGN DRAWING ON TO THE APPROPRIATE DISPATCH ORDER AND LOCATION. ANY ADDITIONAL UNDESIGNED CONDUIT OR STRUCTURES WILL BE SHOWN PER THE SAME STANDARDS.

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	Indicates Latest Revision	Completely Revised	New Page	Information Removed
3150.1	SDG&E ELECTRIC STANDARDS			REVISION
	ELECTRIC CONDUIT FIELD MAPPING			DATE 1-1-94 APPD <i>[Signature]</i>

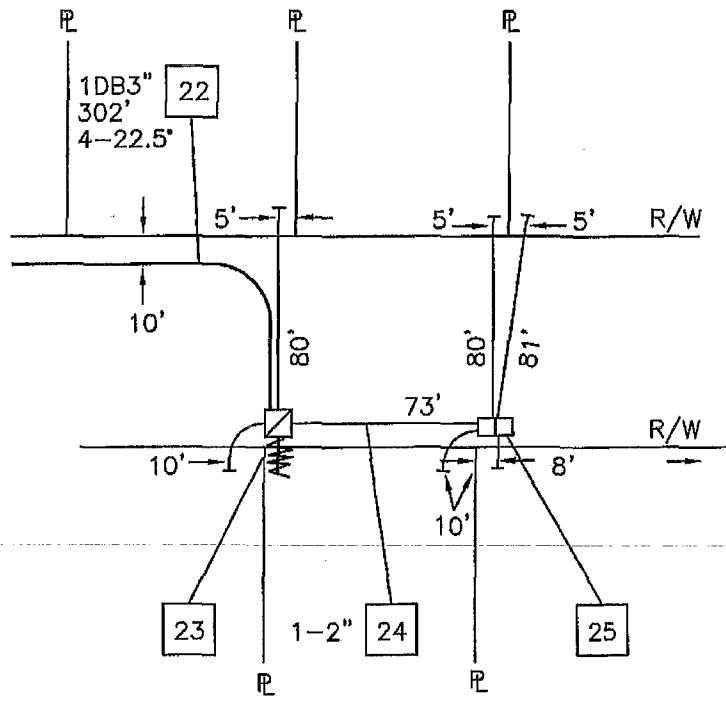
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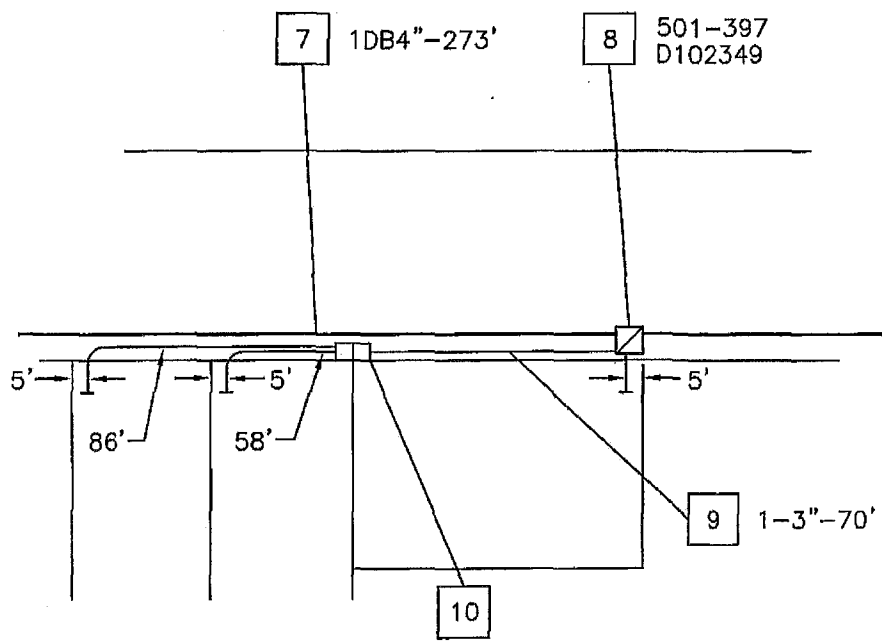
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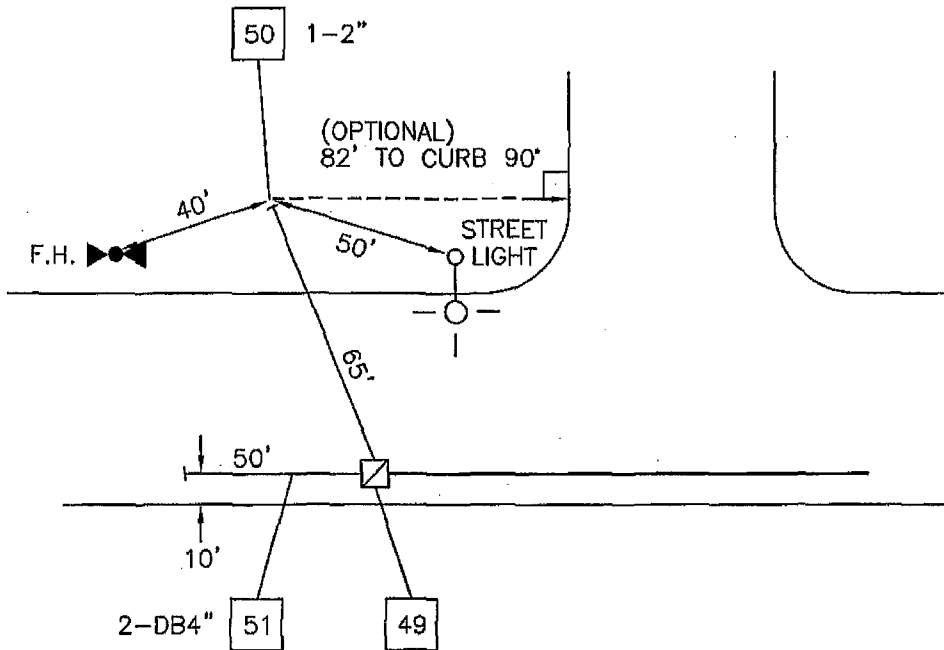
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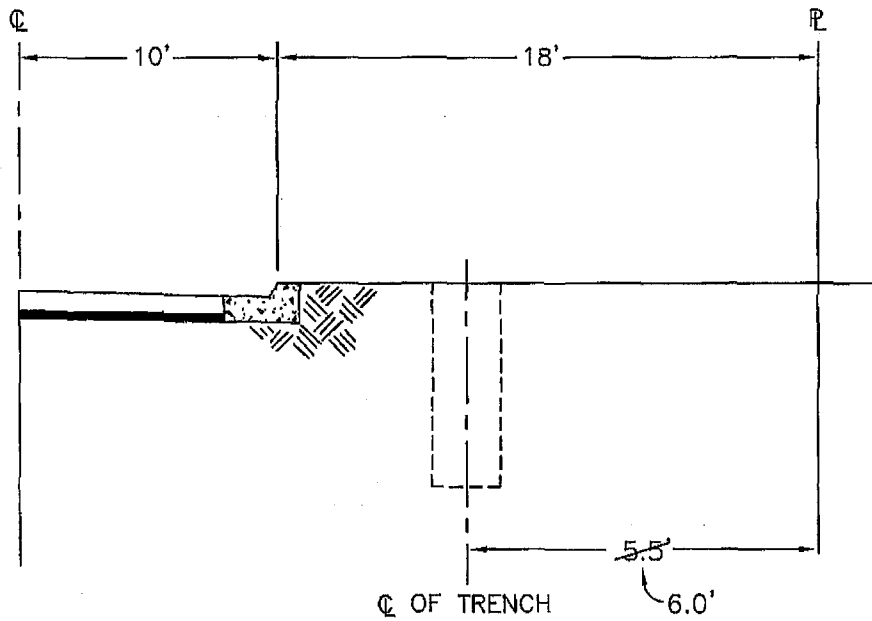
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3150.3	SDG&E ELECTRIC STANDARDS			REVISION
	ELECTRIC CONDUIT FIELD MAPPING			DATE 1-1-94 APPD <i>[Signature]</i>

(D)



(E)

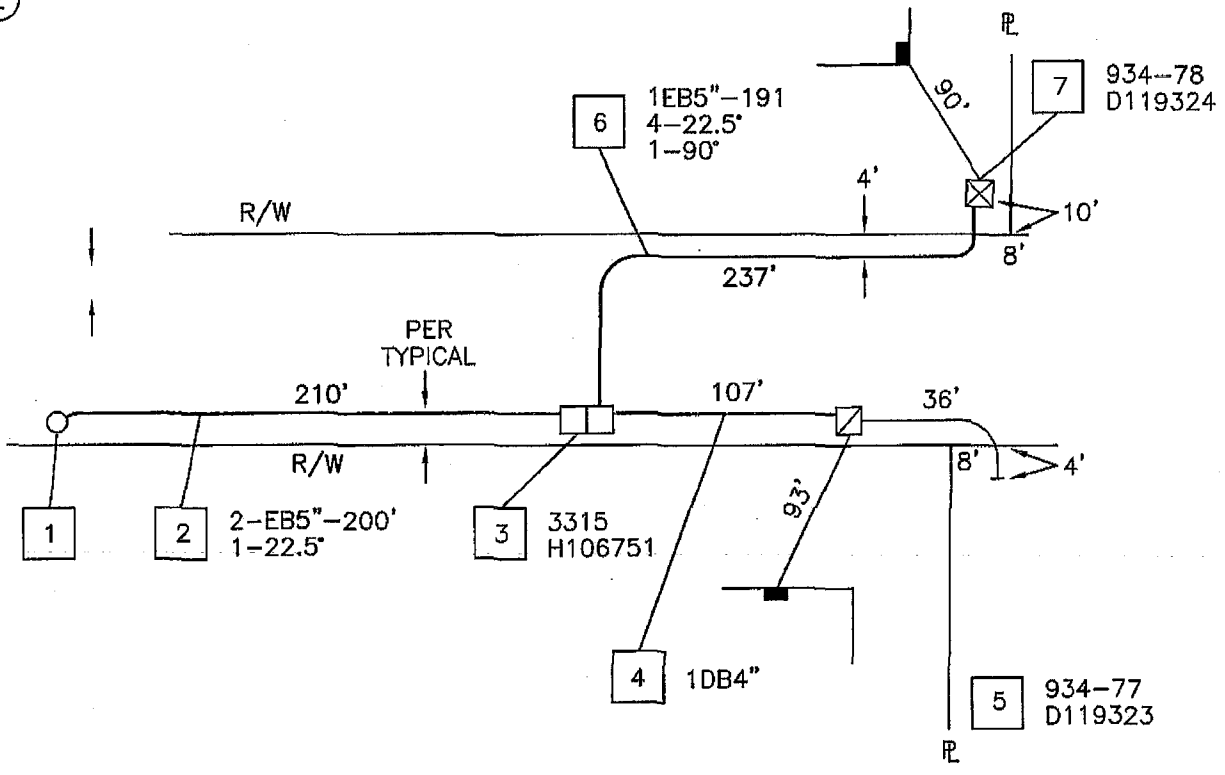


TYPICAL STREET SECTION
NO SCALE

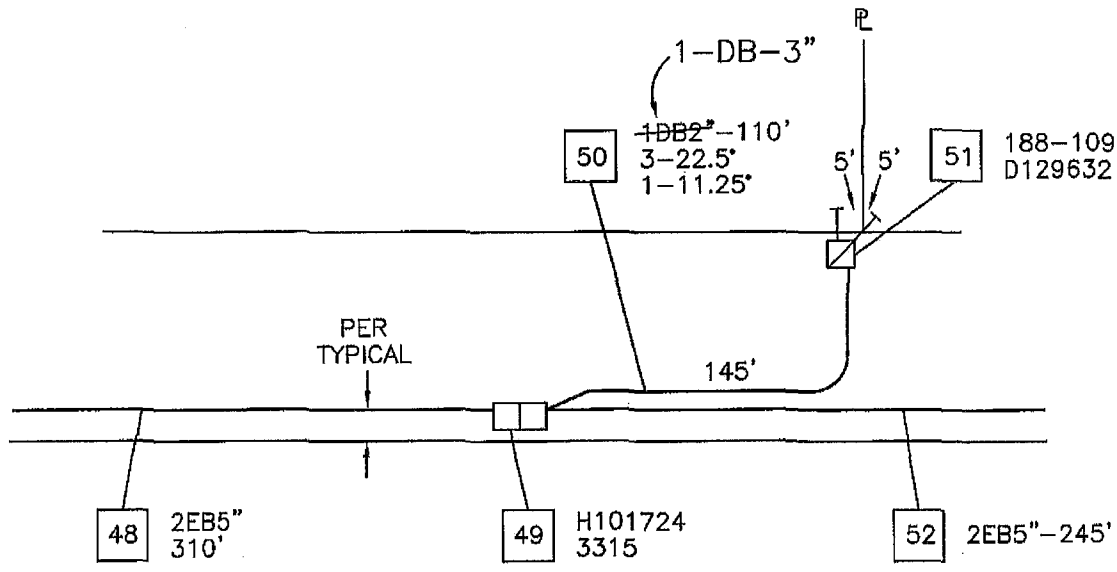
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REVISION	SDG&E ELECTRIC STANDARDS			
DATE 1-1-94	ELECTRIC CONDUIT FIELD MAPPING			3150.4
APPD <i>JLB/ROJ</i>				

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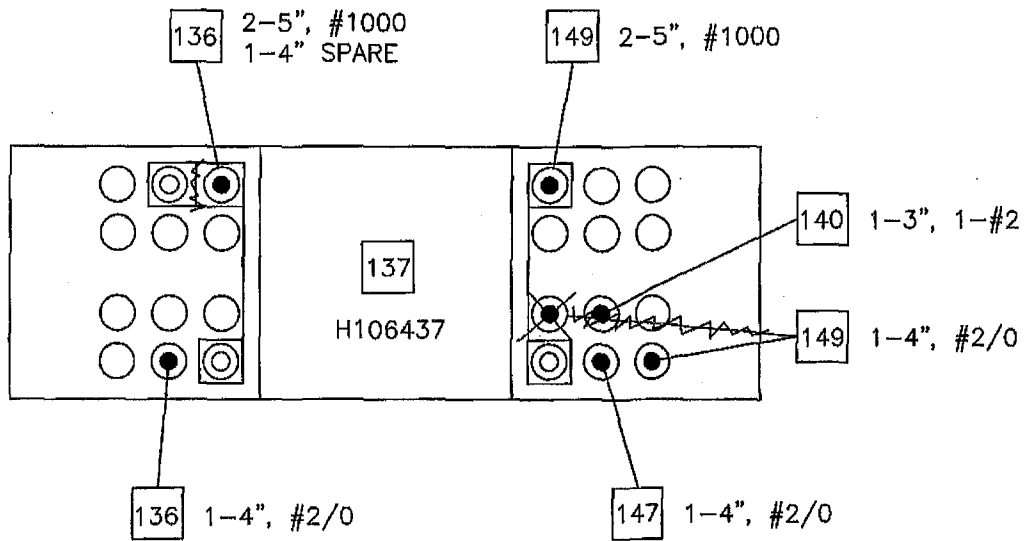
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	ELECTRIC CONDUIT FIELD MAPPING			DATE 1-1-94 APPD <i>[Signature]</i>

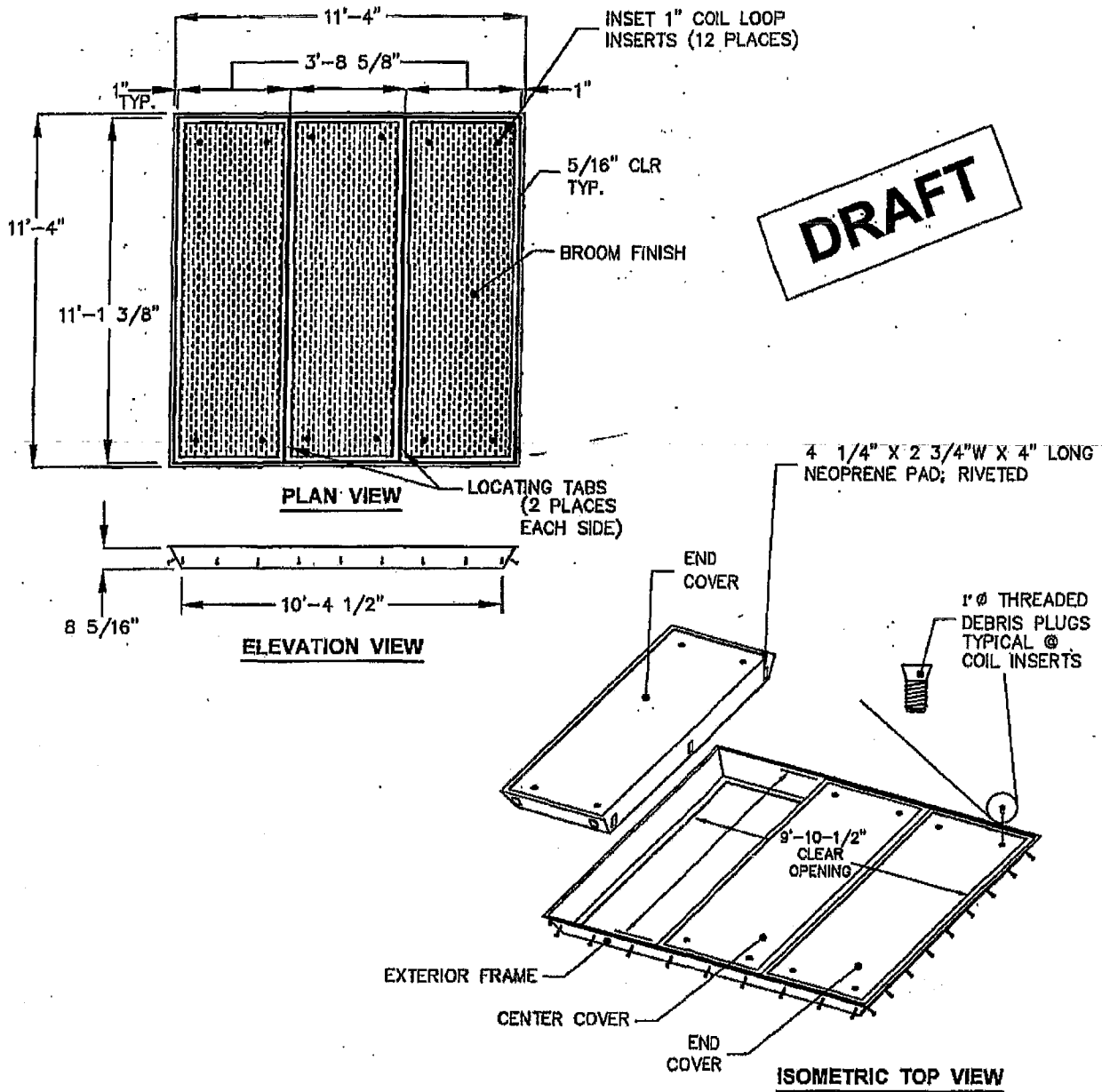
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REVISION	SDG&E ELECTRIC STANDARDS			3150.6
DATE 1-1-94	ELECTRIC CONDUIT FIELD MAPPING			
APPD <i>[Signature]</i>				

SCOPE THIS STANDARD SHOWS THE DETAILS OF A CUSTOMER BELOW GRADE VAULT EQUIPMENT OPENING WITH A THREE PIECE CONCRETE LID.

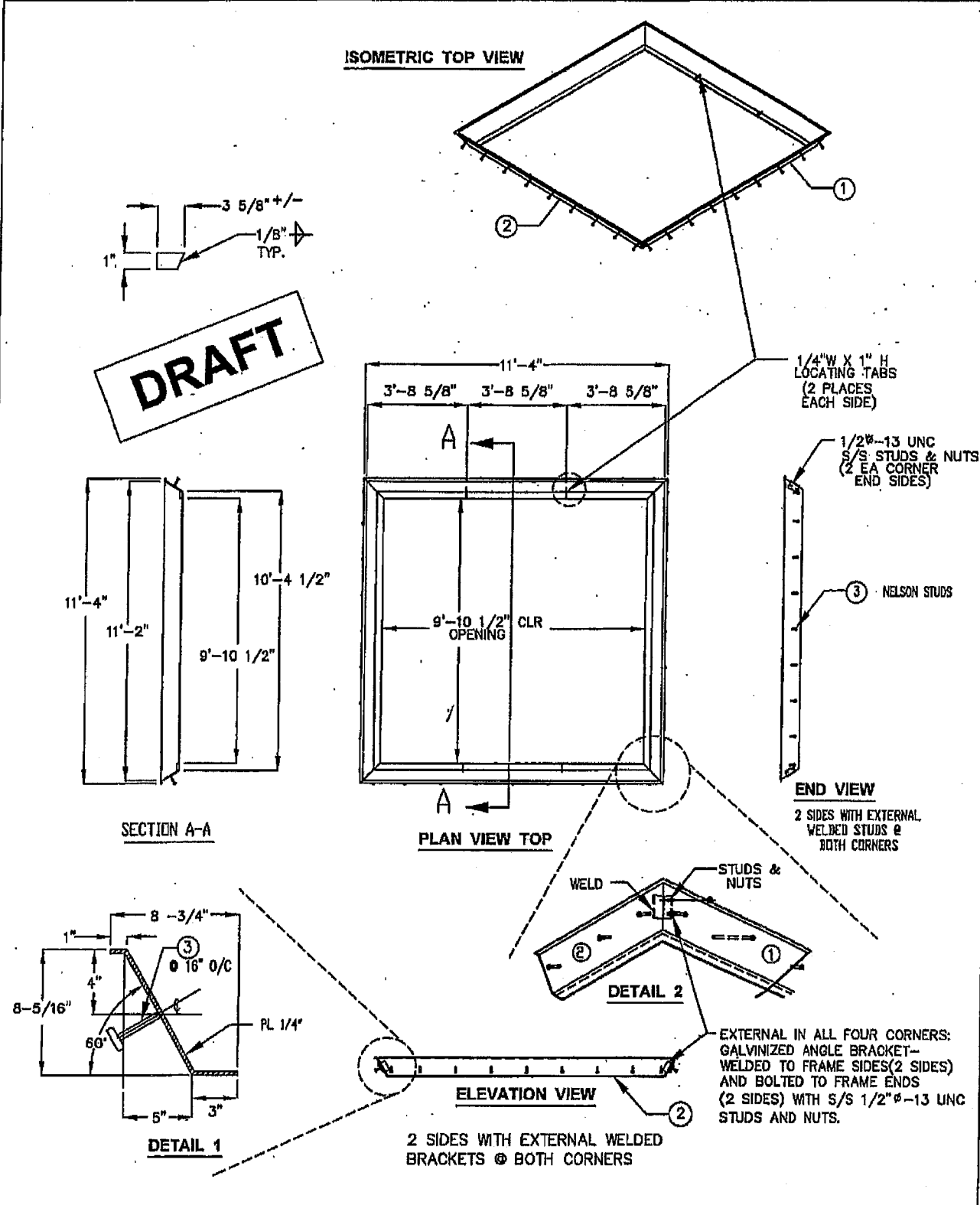


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- NOTES:**
1. PRECAST SUPPLIER TO DESIGN LID SECTIONS FOR HS-20 LOADING AND FOR LIFTING LOADS.
 2. EACH LID SECTION TO HAVE 4 LIFTING INSERTS, LOCATED NEAR THE CORNERS, WITH DEBRIS DEBRIS PLUGS. INSERTS TO BE 1" Ø THREADED COILS WITH MIN. 4500 LB WORKING LOAD IN TENSION FOR EACH COIL.

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REVISION	SDG&E ELECTRIC STANDARDS			
DATE 9-16-10	CUSTOMER VAULT EQUIPMENT OPENING			3333.1
APPD TR/MJC	THREE PIECE COVER			

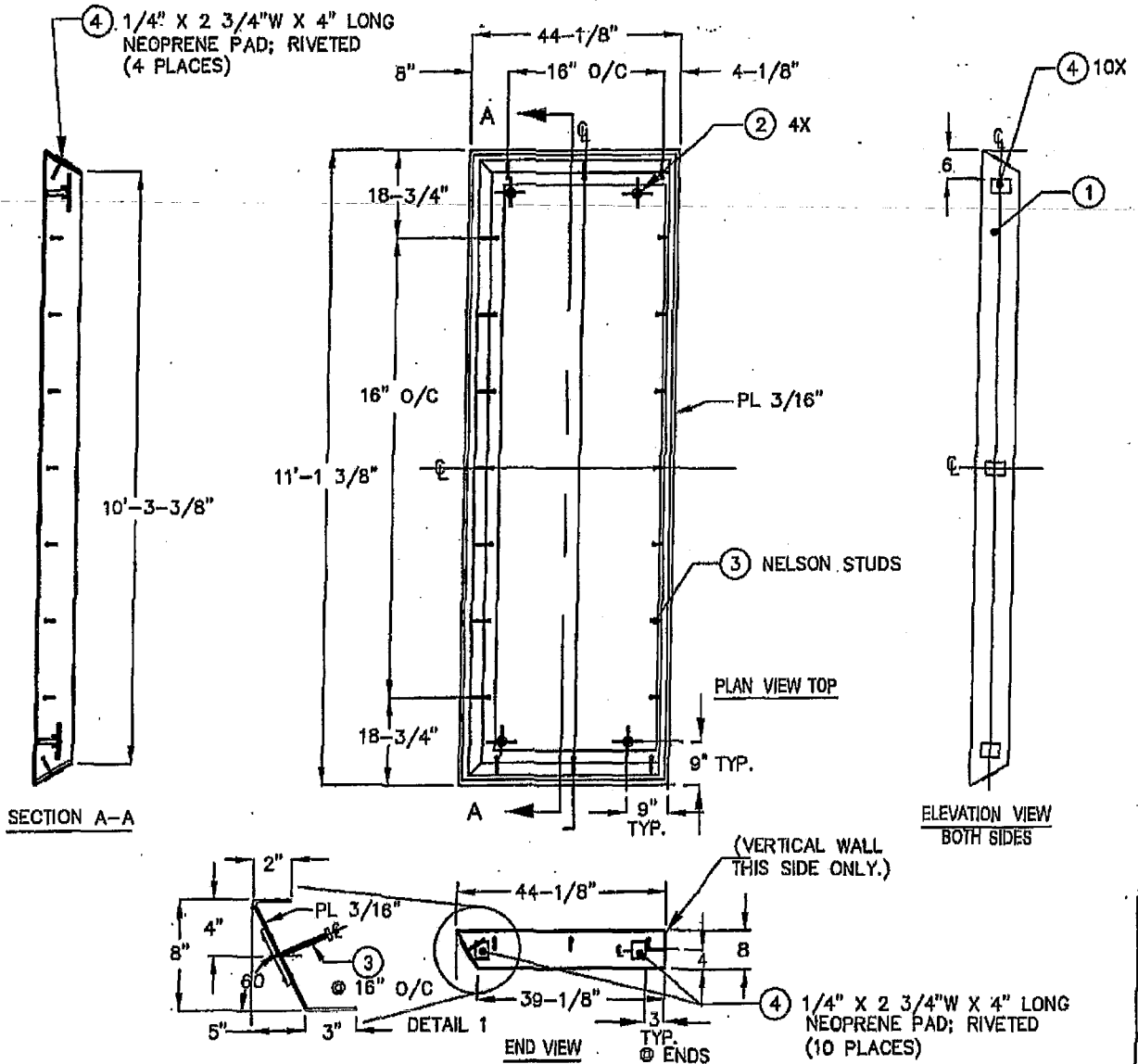
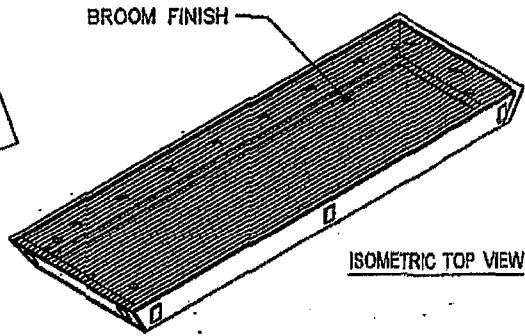


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3333.2	SDG&E ELECTRIC STANDARDS	REVISION
	CUSTOMER VAULT EQUIPMENT OPENING THREE PIECE COVER	DATE 9-16-10 APPD TR/MJC

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SDG&E ELECTRIC STANDARDS


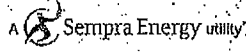
CUSTOMER VAULT EQUIPMENT OPENING
THREE PIECE COVER

REVISION

DATE 9-16-10

APPD TR/MC

Developer / Customer

 	Issue Revision Date 7/22/2010	SDG&E ELECTRIC VAULT REQUIREMENTS AND SPECIFICATIONS	Page 1 of 30
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The following specifications have been compiled for the installation of SDG&E distribution facilities in a customer-owned vault. The information provides requirements to be followed for the construction of the vault and installation of electrical equipment per SDG&E standards. Consult the appropriate regional Project Management Office/service center for approval whenever any alteration to or deviation from these plans and specifications are contemplated. See service center and phone number listed below.

This installation must comply with all applicable rules of the Electrical Safety Orders of the Division of Industrial Safety, Department of Industrial Relations, State of California, National Electric Code, California Code of Regulations Title 8, and other governing codes and ordinances.

PROJECT TITLE: Bayside Fire Station

PROJECT LOCATION: Cedar & Pacific Coast Hwy

PROJECT NUMBER: 061621-020

SERVICE CENTER: Metro

PHONE NUMBER: 858-636-3992

PLANNER: Jason Seiler DATE: 8/30/2011 APPROVAL: *Barbara D. Johnson*

9/7/2011

Centre City
Development Corp.

SEP 16 2011

Orig. To
Copy To

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Issue
Revision Date
7/22/2010

**SDG&E
ELECTRIC VAULT
REQUIREMENTS AND SPECIFICATIONS**

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CUSTOMER SHALL FURNISH, INSTALL, OWN, AND MAINTAIN:**1. TRANSFORMER VAULT:**

- 1.1. Walls, roof, and floor (other than when laid on earth) shall be of assemblies of materials approved for three-hour non-combustible fire resistive construction (California Code of Regulations, Title 8, section 2806). All walls to be solid or solid filled. All concrete block or brick joints to be solid mortared. All floor-to-wall joints, wall-to-wall joints and wall-to-ceiling joints to be sealed water-tight with water and oil resistant materials. Street grade vaults only require seam sealing of floor-to-wall joints and wall-to wall joints to a height of 6" above floor, with water and oil resistant materials.
- 1.2. A 6" threshold for oil retention shall be provided at all vertical access openings into vault. See section 24.
- 1.3. Vault size 22' x 18.5' (inside dimensions). See section 23 for dimension table.
- 1.4. Whenever a vault is constructed over sublevels of a structure, the customer is to provide SDG&E with a certificate from a civil engineer registered in the State of California verifying the structural adequacy of the building to support the transformers and the fire withstanding capabilities of the structure's floor, ceiling and walls. Vault floor to be capable of supporting combined equipment weight of 12,000 pounds.
- 1.5. Any vault construction below finished grade is to be considered a dry vault. The exterior surfaces of a dry vault which are exposed to surrounding earth conditions shall be sealed water-tight with an impermeable seal so as to prevent water entry through any portion of the vault. See section 1.1 above for sealing requirement for wall, floor and ceiling joints.
- 1.6. No ducts, pipes or conduits, except those which are a part of the electrical installation shall be installed in or through the vault. Sprinklers and smoke detectors shall not be installed in the vault room.
- 1.7. Any and all conduits passing through vault floor or walls (see section 1.6 above) shall be sealed water-tight with water and oil resistant materials on exterior surface. In addition, customer must apply a one inch thick and one inch wide layer of sealant mastic around the conduit in the center of the form before concrete is poured. See SDG&E Underground Construction Standard page 3960 for illustration of required technique, recommended materials and required spacing between conduits. Contact SDG&E inspector at least one (1) day in advance to schedule inspection of construction of vault walls through which electric conduit pass.
- 1.8. Any and all spare conduits between the vault and a substructure located outside the vault shall be plugged at both ends with expandable duct plugs.
- 1.9. Customer shall inform SDG&E when any pre stressed concrete portions of vault are proposed for construction.

2. PERSONNEL ACCESS DOOR (MAN DOOR):

- 2.1. Developer / customer is to provide a 3' x 6'-8", 3-hour fire-rated self-closing personnel access door equipped with panic hardware, and should be located as shown in section 21 or 22.

- 2.2. Developer / customer to provide light switch, with lighted switch plate, inside vault and adjacent to door.
- 2.3. Developer / customer to install **weather strips on all door edges** to prevent excessive air intake around door edges when vault ventilation is operating and to limit fresh air intake in case of fire.
- 2.4. Developer / customer shall provide and install a Schlage VTQP section MA series key section in a storeroom function (self locking) Rhodes series lever action lockset. SDG&E will replace the MA series cylinder with an electric series cylinder prior to energizing the service. The developer is required to notify SDG&E's inspector when the lockset is installed.
- 2.5. Personnel access door shall open into a clear area that will allow manual carry-in of small tools and equipment. Personnel access doors in garage areas shall open into designated no-parking zone and have permanent unobstructed access to door.
- 2.6. Door threshold to be 6" above vault floor for oil retention. All threshold seams, if any, to be sealed with water and oil resistant materials. See "Equipment Opening in Vault Wall" illustration in section 25.
- 2.7. Developer/customer to attach sign/placard to door stating the following:

"SDG&E Electric Vault", "Danger – High Voltage – Keep Out."
- 2.8. Developer to provide SDG&E with an approved route with 24 hour access easement to the personnel access door in the vault. If an electrically operated gate is installed restricting SDG&E access to the man door, developer shall install a Schlage VTQP quad section cylinder in a key switch wired to the gate controller. A list of locksmiths authorized to sell SDG&E approved locks is available on request. The developer will install a means of opening the gate from the inside without the use of a vehicle to activate the controller. This will require the installation of an additional key switch inside the gate if there is no unsecured switch available. Door to have 24-hour direct ingress and egress for SDG&E personnel.

3. EQUIPMENT OPENINGS:

- 3.1. **Below grade vaults:** 10 Ft. X 10 Ft. Equipment opening through vault ceilings. Customer / developer shall provide removable 3-hour fire rated 3 part concrete cover with wheel load-factor HS-20 (per AASHTO). Customer to submit drawings approved by civil engineer registered in the State of California verifying HS-20 wheel loading for each equipment opening cover. No section of covers to exceed 4,800 lbs. Both opening and cover/s shall have matching beveled edges, with 30° vertical deflection. Four lifting coil inserts to be provided for removal of each section of cover. Lifting inserts shall be 1" threaded coil inserts with 4,500 lbs safe working load tension – see section 21.3.2. See section 21 for illustrative details for equipment opening cover. The equipment opening must be kept clear and unobstructed by customer-installed equipment both above and below the opening. A minimum vertical clearance of 30' - for operation of heavy equipment including cranes - must be provided above the equipment opening – see illustration in section 25. Customer shall seal the cover to prevent water entry following installation of equipment – see section 21 for required technique and materials. Repair, maintenance or replacement of any old or new, damaged covers is the responsibility of the customer / developer. SDG&E to determine when replacement is necessary.



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**SDG&E
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- 3.2. **At grade vaults:** 10 Ft. X 10 Ft: Equipment opening through exterior vault wall. Equipment access door shall be 3-hour fire rated and have 24-hour direct access for SDG&E personnel. Developer shall provide and install a Schlage VTQP quad section MA series key section. SDG&E will replace the MA series cylinder with an electric series cylinder prior to energizing the service. A permanent and level six-foot clear working area, at least as wide as the door, is required outside of the equipment access door and at the same grade as the vault floor.
- 3.3. Customer to install removable 6-inch oil retention sill at equipment opening floor level when there is no other access for installing or removing transformers or other vault equipment. Sill construction to be 6-inch steel box beam. Bolts to pass through beam and align with inserts embedded in base of equipment opening. The beam must align with floor base and vertical edge to provide close fit for sealant compression to retain oil inside vault. Sealant to be oil and water resistant. See section 24.
- 3.4. Customer to provide personnel access opening with 30" cast-in-frame ring and a 34" cast iron cover. Opening to be adjacent to equipment opening and at final grade. No coverings are permitted over this opening. Locate opening as shown on Vault Design sketch. See SDG&E Underground Standards page 3332.
- 3.5. **Truck Access on Private Property:** If both the equipment opening and access route to equipment opening is located on private property, customer will provide permanent "all weather" drivable access route to equipment opening. This permanent access route shall be of sufficient strength to support truck weight class HS20 (20 tons per axle), be a minimum of 16' wide and 13'-6" high, with permanent turnaround having 16' minimum turning radius – as measured from inside radius edge. Customer may provide permanent drive through access route in lieu of turnaround if so desired. Customer to install "Permanent SDG&E Truck Access Route" placard along access route with a minimum of one placard every 25'.
- 3.6. **Truck Work Area on Private Property:** If equipment opening is located on private property and area in immediate vicinity of equipment opening is also located on private property, customer will provide clear and permanent truck work area at least 50' long x 16' wide, centered on equipment opening.
- 3.7. **Truck Access in Public Right-of-Way:** If equipment opening is adjacent to public right-of-way, or in public right-of-way, it shall be located such that it provides the same truck access as for private property.
- 3.8. **Truck Work Area in Public-Right-of-Way:** If equipment opening is adjacent to public right-of-way, or in public right-of-way, it shall be located such that it provides the same truck work area as for private property.
- 3.9. **Boom Clearance:** Customer will provide permanent overhead boom clearance at equipment access opening as shown in "Electric Vault Location and Accessibility" illustration in section 22.
- 3.10. **Restrictions:** customer is not permitted to install tables, chairs, partitions, posts, signs, screens, walls, fences, railings, or barriers of any nature above or in front of SDG&E equipment opening or personnel access opening into electric vault.

4. PULLING INSERT REQUIREMENTS

- 4.1. Transformer/switch/equipment moving inserts (A) – 1" diameter galvanized pulling irons located 48" up from vault floor, per attached SDG&E sketch. The coil insert strength shall be 10,000 pounds minimum with a working load safety factor 3. The concrete vault to have a safety factor of 2 for these loads.
- 4.2. Cable pulling insert (B) (below grade vaults) – One (1) 7/8" diameter galvanized pulling iron(s) located in the opposite wall and at same height as incoming conduits. Pulling iron(s) to be designed to provide a minimum pulling tension of 12,000 lbs. The concrete vault to have a safety factor of 2 for these loads. A clear and unobstructed path must be provided and maintained between the conduit opening (into the vault) and the pulling eye on the opposite wall.
- 4.3. Cable pulling insert (C) (below grade vaults) – One 1" diameter galvanized pulling iron in same wall as cable pulling insert required in section 4.2 above, located directly opposite equipment opening, 48" above the vault floor. Pulling iron to provide a minimum pulling tension of 12,000 lbs. The concrete vault to have a safety factor of 2 for these loads. A clear and unobstructed path must be provided and maintained between cable pulling insert in section 4.2 and this cable pulling insert.
- 4.4. Cable pulling insert (E) (on grade vaults) – One 1" diameter galvanized pulling iron located in vault ceiling directly above incoming conduits in vault floor. Pulling iron to provide a minimum pulling tension of 12,000 lbs. The concrete vault to have a safety factor of 2 for these loads.
- 4.5. Optional cable and/or transformer insert – may be located in the vault floor a minimum of 9" from any wall face, and located per attached work order sketch.

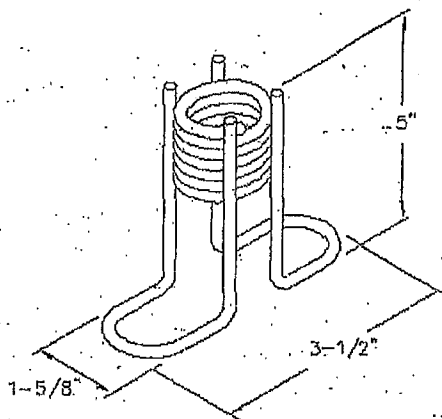


Figure 1 - Typical coil insert for use in thin slabs or small sections.



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5. VENTILATION SYSTEM:

- 5.1. Ventilation openings shall be located as far away as practicable from building doors, windows, fire escapes and combustible material. (California Code of Regulations, Title 8, section 2806). Openings inside the vault shall be located so as to direct the air stream over and around the transformer/s.
- 5.2. Supply Air (Intake) Opening for supply air shall be provided from a source of clean outside air or garage air. Intake louver(s) shall be provided on the outside of the building or in the garage, located a minimum of 18" above grade and per local codes. Intake louver(s) shall be sized per the louver manufacturer's recommendations to minimize entrainment of water into the air stream. Intake louver(s) shall be provided with bird screens. 3 hr fire-rated ductwork shall connect the intake louver(s) to the vault. Ductwork shall be sized and designed per SMACNA, ASHRAE, and industry standards. Ductwork sizing shall consider pressure drop, air velocity and noise. Supply air opening(s) shall be located 18' above the floor of the vault and positioned to promote good cross ventilation/ distribution of supply air across the entire vault. Supply air openings shall be constructed with a 1/2" mesh hardware cloth and sized for a maximum face velocity of 800 feet per minute. In addition, the foregoing installation is to comply with all local codes and ordinances.
- 5.3. Exhaust Air (Discharge): Ventilation and cooling air from the vault shall be discharged to the outside of the building or garage through exhaust louver(s). Exhaust louver(s) shall be located a minimum of 18" above street grade, away from intake louver(s) and building openings and per local codes. Exhaust louver(s) shall be sized per the louver manufacturer's recommendations. Exhaust louver(s) shall be provided with bird screens. 3-hr fire-rated ductwork shall connect the exhaust louver(s) to the vault. Ductwork shall be sized and designed per SMACNA, ASHRAE, and industry standards. Ductwork sizing shall consider pressure drop, air velocity and noise. Exhaust opening(s) shall be located near the ceiling of the vault and positioned to promote good cross ventilation and/or distribution of supply air across the entire vault. Exhaust openings shall be constructed with a 1/2" mesh hardware cloth and sized for a maximum face velocity of 800 feet per minute. In addition, the foregoing installation is to comply with all local codes and ordinances.
- 5.4. Ventilation fan motor may be located inside or outside transformer vault. Coordinate with SDG&E to determine acceptable location prior to purchase of equipment. Ventilation fan motor installation is to comply with all local codes and ordinances.
- 5.5. Ventilation fan motor inside transformer vault shall have a disconnect located (and marked) inside the vault adjacent to personnel access door. Customer to provide thermostat control, with a range of 70 to 140°F located inside the vault mounted away from intake and exhaust vents in easily accessible location ("Minneapolis – Honeywell thermostat model or equivalent"). Customer to provide regular scheduled maintenance for ventilation fan motor. Coordinate with SDG&E for access to transformer vault.
- 5.6. Ventilation fan motor outside transformer vault shall have a lockable disconnect located outside the vault in the immediate vicinity of fan motor. Appropriate permanent signage is to be posted adjacent to outside lockable disconnect warning against tampering or disconnecting the vault ventilation. Customer to provide thermostat control, with a range of 70 to 140°F located inside the vault mounted away from intake and exhaust vents in easily accessible location ("Minneapolis – Honeywell thermostat model or equivalent"). Customer to provide regular scheduled maintenance for ventilation fan motor.

- 5.7. Fire dampers shall be installed as required by local and State governing agencies having jurisdiction for the Occupancy type for the building. Any required fire dampers are to be located within vault. Provide adequate clearance for fire damper installation on supply & exhaust vent openings if dampers are required.
- 5.8. One continuous 1300 CFM (minimum) exhaust fan direct driven by a 120 V phase, sealed ball bearing motor. Fan to be mounted as close to the ceiling as practicable when located inside vault.
- 5.9. Vents, Ducts and flues shall not be connected with any other ventilation or air distribution system and must be for exclusive use of electric (transformer) vault.
- 5.10. See Section ~~24~~ for Internal Vault Wiring Diagrams.
 - 5.10.1. Note - No gas meter set assemblies are allowed within 10' of intake or discharge vents.

6. VAULT LIGHTING SYSTEM:

- 6.1. Vault light switch and 120v power receptacle.
- 6.2. EXO switch complete with protection. Ventilation blower motor and vault lighting system to be separately protected. See attached page 18 for diagram schematic.
- 6.3. Customer to wire out per authority having jurisdiction (AHJ) from point adjacent to secondary side of transformer to EXO switch and interconnect vault lights, switch and receptacle, exhaust fan and thermostat control as required.
- 6.4. Four-foot double fluorescent lamp fixture with minimum 40-watt bi-fin lamps to be mounted on ceiling or maximum height of 9 feet above floor level, at locations as specified on SDG&E drawing.
- 6.5. See Section 23 for Internal Vault Wiring diagrams.

7. VAULT DRAINAGE SYSTEM: (CHECK WITH CITY IF REQUIRED)

- 7.1. When Governmental or Municipal authority requires a vault drainage system, the customer is to install a standard floor drain connected to a dry sump located outside of the vault. Slope the floor gently to this drain and cover with standard grating. Customer will be responsible for maintaining all components of drainage system in good working condition.
- 7.2. The design and installation of vault drainage system (provided by the customer) must be approved by the appropriate inspection authority and must meet all local and federal environment requirements for all components.
- 7.3. Customer is responsible for proper environmental disposal of any and all liquids recovered by vault drainage system.
- 7.4. Waste collection container must be capable of containing the total volume of oil for projected maximum size transformer/s (based on panel size/s) that can be used in vault. Contact SDG&E for volume requirement.



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- 7.5. Whether or not Governmental or Municipal authority requires a vault drainage system, customer will install a sump hole directly below street level personnel access opening - in below grade vaults only.

8. VAULT GROUNDING SYSTEM:

- 8.1. Trench grounding is the preferred method for providing grounds for all vaults. Customer to install 30' of 4/0 bare stranded copper wire in the primary trench closest to building and in case the 4/0 bare copper wire in the base of the trench using Ground Enhancement Material (GEM). See SDG&E UG Standard 4510. Customer to insert 4/0 ground wire into 1" PVC conduit for transition through vault/building wall. See SDG&E UG Standard 3960.2 for required technique and materials to transition PVC conduit through concrete. Ground wire inside vault to reach vault floor + 24" additional length.
- 8.2. As an alternative method, only when the approaching primary trench is less than 30' in length, customer to install 2 - 5/8" X 10' long copper clad steel ground rods at minimum 6' interval in the primary trench. Install 4/0 bare stranded copper wire ground wire. Rods to be interconnected with 4/0 bare strand copper wire. See SDG&E UG Standard 4510. Customer to insert 4/0 ground wire into 1" PVC conduit for transition through vault/building wall. See SDG&E UG Standard 3960.2 for required technique and materials to transition PVC conduit through concrete. Ground wire inside vault to reach vault floor + 24" additional length.
- 8.3. Customer to provide individual equipment grounds within the vault for all transformers, capacitors, cable taps and fuse cabinets as specified by SDG&E. Customer to install/imbed 1-#2/7 bare strand copper wire into vault floor for each transformer, capacitor, fuse cabinet and set of cable taps. Equipment ground wire to run from primary side of each transformer or capacitor, from below middle cable tap, and from below fuse cabinet, to a position just below entry point where 4/0 bare stranded copper trench ground wire transitions through vault wall - see 8.1 or 8.2 above. Customer to provide 24" (minimum) tail at each end of (each) equipment ground wire imbedded in the floor of the vault.
- 8.4. Contact SDG&E inspector at least one (1) day in advance to schedule inspection of installation of trench ground outside vault (prior to backfill) and/or equipment ground imbedded in vault floor. Customer to provide ladder access and a safe temporary access path (plywood or planks) within the vault for SDG&E inspector to make the inspection.
- 8.5. SDG&E will install required interior grounding for switches inside the vault.

9. PRIMARY CONDUIT, EXTERIOR and INTERIOR:

- 9.1. Primary exterior conduits shall be direct buried, concrete encased or a combination of both - as specified by SDG&E.
- 9.2. Primary exterior conduits shall terminate in corner of vault as specified by SDG&E Project Management Dept. Top of conduit package shall terminate no less than 60" below interior surface of vault ceiling.
- 9.3. Any and all conduits passing through vault exterior wall (see section 16 & 17 above) shall be water-tight with water and oil resistant materials. Conduit must be sealed on vault exterior surface. In addition customer must apply a one inch thick and one inch wide layer of sealant mastic around



each conduit in the center of the form before concrete is poured. See SDG&E Underground Construction Standard page 3960 for illustration of required technique, recommended materials and required spacing between conduits. Contact SDG&E inspector at least one (1) day in advance to schedule inspection of vault floor through which conduits pass.

9.4. Any and all conduits passing through vault floor (see section 9.6 & 9.7 above) shall be sealed water-tight with water and oil resistant materials. If possible, conduit may be sealed on vault interior surface. In addition, customer must apply a one inch thick and one inch wide layer of sealant mastic around the conduit in the center of the form before concrete is poured. See SDG&E Underground Construction Standard page 3960.2 for illustration of required technique, recommended materials and required spacing between conduits. Contact SDG&E inspector at least one (1) day in advance to schedule inspection of construction of vault floor through which conduits pass.

9.5. All primary exterior conduits shall be installed such that they are free and clear of dirt, rocks, or other obstructions. Customer/developer shall install 3/4" pulling and measuring tape rated at 2,500 pound tensile strength in all conduit runs over 10'. Each conduit will have at least a two-foot measuring tape coil securely tied at each terminating end of conduit run. Horizontal conduit bends shall be 25ft radius of curvature.

9.6. Contact SDG&E inspector at least one (1) day in advance to schedule inspection of installation of primary exterior conduit system (prior to backfill) Note: service conduits not included in this section

9.6.1. 1 (#. Conduits), 3 In. Size, DB Type

9.6.2. 1 (#. Conduits), 2 In. Size, DB Type

9.6.3. 1 (#. Conduits), 3 In. Size, DB Type

9.6.4. 1 (#. Conduits), 4 In. Size, DB Type

9.7. Primary interior conduit may be installed beneath the vault floor provided vault floor is located at street level and is completely resting on earth.

9.8. Cable troughs may be installed in vault floor as substitute for primary interior conduits. Customer to submit specification to SDG&E for approval prior to fabrication. Allow 6" of width for each set of distribution cables and 7" of width for each set of feeder cables. The maximum width of any trough will be 30".

9.9. Trough covers will be designed to withstand a minimum of 20,600 lbs. traffic loading capacity (AASHTO H20 and ASTM C 857). Trough cover surfaces must be smooth textured to allow easy pass-over by small roller wheels. Trough covers will be flush mounted and have flush mounted lifting handles on each end, or 1" lifting hole on both ends. Trough cover sections will be limited to a maximum weight of 80 lbs.

9.10. Cable troughs may not pass beneath floor mounted electric equipment. Troughs may terminate beneath floor mounted electric equipment.

9.11. Cable trays may be installed as substitute for primary interior conduits. See section 9.3 & 9.4.



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10. CUSTOMER SERVICE CONDUIT:

- 10.1. Service conduits are only permitted when transformer vault is located at street level and vault floor is resting on earth. Combinations of 3 or 4 inch service conduits may be used provided they do not exceed 6 conduits total. A maximum of 5 - 5 inch service conduits may serve commercial & industrial boards up to 2,000 Amps. A maximum of 5 - 5 inch service conduits may serve residential & multi family boards up to 3,500 Amps.
- 10.2. In addition to truck access required in section 8 above, line truck access is to be provided as indicated in SDG&E Service Standards & Guide, pg 16, when service conduits will be installed.
- 10.3. Service conduit requirements exceeding quantities stated above will require bus duct, rather than conduit, between secondary side of transformer and customer service equipment. When transformer vault is not on street level, and is not resting on earth, bus duct is required between secondary side of transformer and customer service equipment.
- 10.4. Install 1-2" SVC conduit from secondary side of transformer to customer's pull section as indicated on sheet **XX** of **YY**. Terminate primary and service conduits at least 2" above floor to permit sealing (see section 16 & 17 above)
- 10.5. When more than one pull-section is served by the same transformer and the total number of conduits exceeds those listed above, bus duct will be required.
- 10.6. Any and all electric service conduits passing through vault floor shall be sealed water-tight with water and oil resistant materials. See SDGE Underground Standard 3960 for required spacing and specifications to be provided between conduits to allow use of sealing tools. See section 9 above for additional requirements

11. SERVICE ENTRANCE, BUS DUCT:

- 11.1. Service bus way from customer's service equipment to transformer. The design and location must be approved by SDG&E prior to fabrication. Refer to attached enclosure for straight bus section and bus entrance box. For attachment to transformer housing, bus bar configuration and transformer housing see illustrations in section 17 for details/specifications. Bus and entrance box to be permanently supported as required. Horizontal bus sections within vault to maintain 7'-6" vertical clearance above vault floor. Where bus enters vault room, opening to be sealed following bus installation. Bus ampacity to match or exceed panel rating.
- 11.2. Customer service entrance installation to comply with all local codes and ordinances.

12. CUSTOMER'S METERING FACILITIES:

- 12.1. Customer's meter board shall be constructed in accordance with SDG&E's service guide requirements. Manufacturer shall submit drawings to SDG&E Service Standards group for approval prior to fabrication.

13. COMMUNICATIONS CONDUIT:

- 13.1. SCADA: One 4" communications conduit shall be extended from customer vault to closest SDG&E substructure (for supervisory cable). Or one 4" conduit shall be extended to anticipated/future

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SCADA antenna location (for coax cable). Or one 1" conduit shall be extended from customer vault to project telephone equipment area (telephone line). Coordinate with SDG&E Project Management department to determine specific requirement.

14. CABLE TRAY:

- 14.1. The installation of cable trays is not preferred. However, when circumstances prevent the installation of either (primary) conduit or troughs, cable trays may be installed. Customer to submit specifications to SDG&E for approval prior to fabrication.
- 14.2. Refer to Article 392 of the National Electric Code (NEC) for guidelines in selecting the proper cable tray type. (The type of cable to be installed in the tray will dictate the type of cable tray needed).
- 14.3. Refer to Article 392 of the National Electric Code (NEC) for guidelines in calculating the cable tray depth and width. (The type and number of cables to be installed will dictate the depth and width).
- 14.4. Cable tray side rail height should be at least 1" higher than the load depth (the depth of the largest cable).
- 14.5. Cable tray radius: The nominal (inside) bending radius for curved sections of cable trays shall not be less than the minimum allowable bending radius for the largest (triplexed) cable to be installed in the tray. Refer to SDG&E Underground Standard pg. 4004 for a listing of minimum cable bending radius.
- 14.6. Cable tray load/span classification describes the cable tray's load carrying capability for a specific support span. A classification should be selected that reflects the actual working load for each application. Refer to SDG&E Underground Standard pg. 4003.1 for a listing of SDG&E cable weights.
- 14.7. Cable trays shall hang not less than 7'6" above the vault floor.

15. UNISTRUT HANGERS:

- 15.1. Unistrut hangers shall be used to support cable trays and shall be suspended from ceiling of vault. Each unistrut hanger shall be capable of supporting 500 lbs. Unistruts will be spaced such that the maximum load at each unistrut hanger is no more than 250 lbs.
- 15.2. Sufficient unistrut hangers shall be installed such that not more than one cable tray splice plate connection is located between hangers. Curved sections shall have at least one unistrut hanger at the center of the curved section.



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16. SDG&E WILL FURNISH AND INSTALL:

16.1. Transformers

- 16.1.1. 1 Transformer(s) 300 kV. 120 / 208 volt connected for three-phase 4-wire service (weight _____ lbs)
- 16.1.2. 1 Transformer(s) 50 kV. 120 / 240 volt connected for three-phase 4-wire service (weight _____ lbs)
- 16.1.3. 1 Transformer(s) 75 kV. 120/240 volt connected for 1-phase _____-wire service (weight _____ lbs) Note: Open Delta 50 & 75KVA stations to serve 120/240 1/3phase.

16.2. 12KV Distribution Cable and Connectors

- 16.2.1. **Distribution Equipment:** SDG&E will furnish and install in vault (a) CABLE TAPS, (b) transformers, (c) _____-way switch (_____ lbs), (d) wall-mounted fuse cabinet/s and fuses, (e) capacitor (2,000 lbs), (f) SCADA equipment.
- 16.2.2. **Service Conductors:** SDG&E will furnish and install service entrance conductors from transformer secondary terminals to customer's service pull section only when criteria in section 10.1 (above) are satisfied. Otherwise customer will install bus duct.

NOTE - CUSTOMER SERVICE ENTRANCE DESIGN AND LOCATION TO BE APPROVED BY SDG&E PRIOR TO FABRICATION

17. BUS DUCT INTO PAD-MOUNTED TRANSFORMER:

CUSTOMER SERVICE ENTRANCE

DESIGN AND LOCATION TO BE APPROVED BY SDG&E PRIOR TO FABRICATION

BUS DUCT INTO UG. TRANSFORMER:

TOP ENTRY OF TRANSFORMER IS NOT PERMITTED

BUS TO CUSTOMER'S MAIN

30" MAX.

7' 6" MIN.*

SERVICE ENTRANCE BOX

BUS SUPPORTS AS REQ'D.

OPENING TO BE SEALED WHERE BUS ENTERS VAULT ROOM.

CUSTOMER SHALL PROVIDE BUS DUCT ELBOWS, STRAIGHT SECTIONS, "T" SHAPED SPADE TERMINALS INCLUDING ENTRANCE BOX AND SUPPORTS FROM SERVICE MAIN TO TRANSFORMER SECONDARY COMPARTMENT. SEE FOLLOWING PAGE FOR SPECIFICATIONS FOR SPECIFIC TRANSFORMER SIZES.

SDG&E WILL DRILL & BOLT ENTRANCE BOX AT SIDE OF TRANSFORMER AND PROVIDE AND INSTALL COPPER BRAID CONNECTION.

BOX SHALL NOT BE USED AS BUS DUCT SUPPORT. CUSTOMER TO PROVIDE SUPPORT AS REQUIRED. ENTRANCE BOX AND CUSTOMER'S BUS MUST BE 30" OR LESS IN DEPTH

TRANSFORMER SECONDARY COMPARTMENT

WHERE BUS IS REQ'D TO BE WEATHERPROOF. HOUSING FLANGE WITH MATCHING WEATHERPROOF GASKET TO BE PROVIDED.

SIDE VIEW

MAX. 18"

MAX. 24"

FLEXIBLE COPPER BRAID (SEE CHART PAGE 100.8 FOR REQUIRED QUANTITY)

TYPICAL "T" SHAPE SPADE TERMINAL MOUNTED ON BUS RISER DRILLED PER CHARTS ON PAGE 100.9.

SPACING BETWEEN TOP OF TERMINALS AND SPADE: ALL PHASES & NEUTRAL

10" min
11 1/2" max

FRONT VIEW

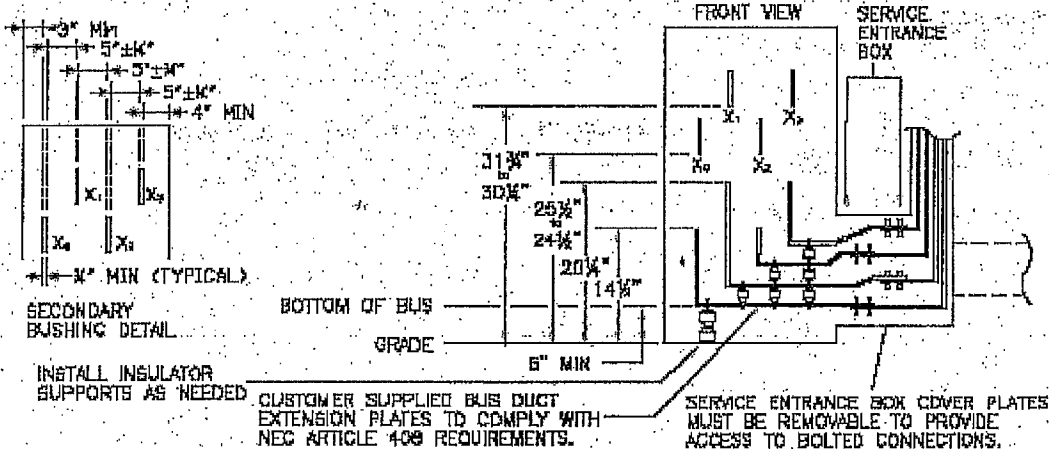
SERVICE ENTRANCE BOX

* BUS DUCT SHOULD BE LOCATED TO AVOID CONFLICT WITH SPACE RESERVED FOR PULLING CABLE INTO VAULT - SEE SECTION 4.2.

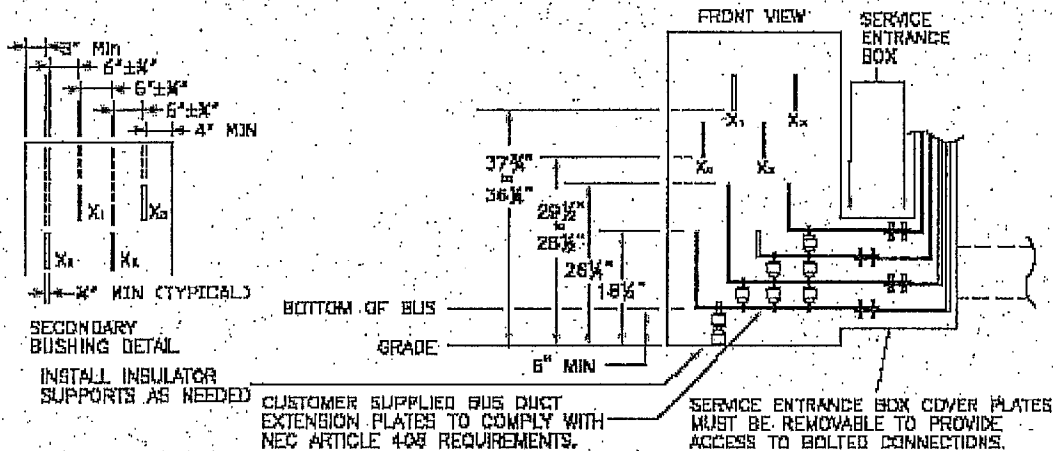
BOTTOM OF BUS
6" MIN GRADE

SERVICE ENTRANCE BOX COVER PLATES MUST BE REMOVABLE TO PROVIDE ACCESS TO BOLTED CONNECTIONS.

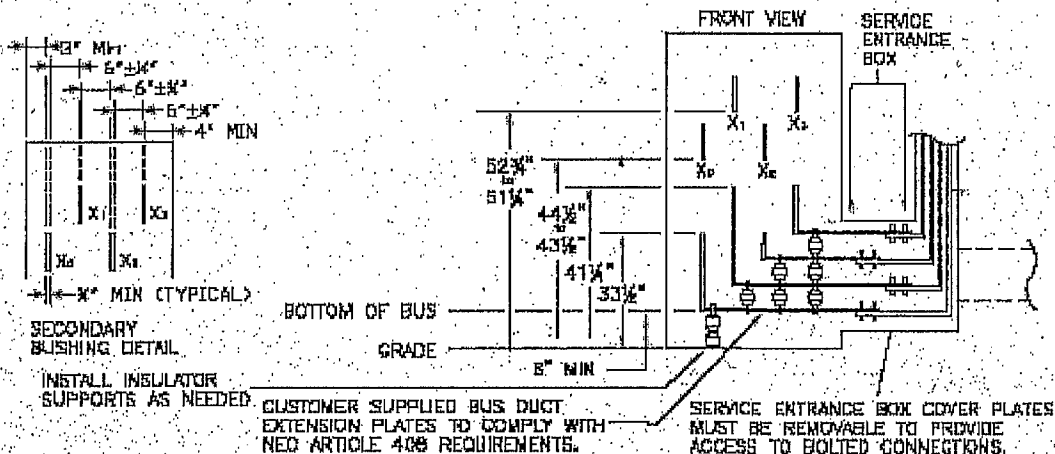
CUSTOMER SERVICE ENTRANCE BOX FOR 75 KVA and 150 KVA TRANSFORMER
DESIGN AND LOCATION TO BE APPROVED BY SDG&E PRIOR TO FABRICATION



CUSTOMER SERVICE ENTRANCE BOX FOR 225 KVA, 300 KVA & 500 KVA TRANSFORMER
DESIGN AND LOCATION TO BE APPROVED BY SDG&E PRIOR TO FABRICATION



CUSTOMER SERVICE ENTRANCE BOX FOR 750 KVA, or LARGER, TRANSFORMER
DESIGN AND LOCATION TO BE APPROVED BY SDG&E PRIOR TO FABRICATION



18. COPPER BRAID SIZING CHART:

18.1. Three-phase padmount transformers (number of 600 amp secondary braided jumpers per phase to be used)

SECONDARY VOLTAGE

<u>KVA</u>	<u>208Y/120</u>	<u>240 DELTA</u>	<u>480Y/277</u>
75	1	1	1
150	1	1	1
225	2	2	1
300	2	2	1
500	4	3	2
750	6	—	3
1000	7	—	3
1500	11	—	5
2000	—	—	6
2500	—	—	8
3000	—	—	9



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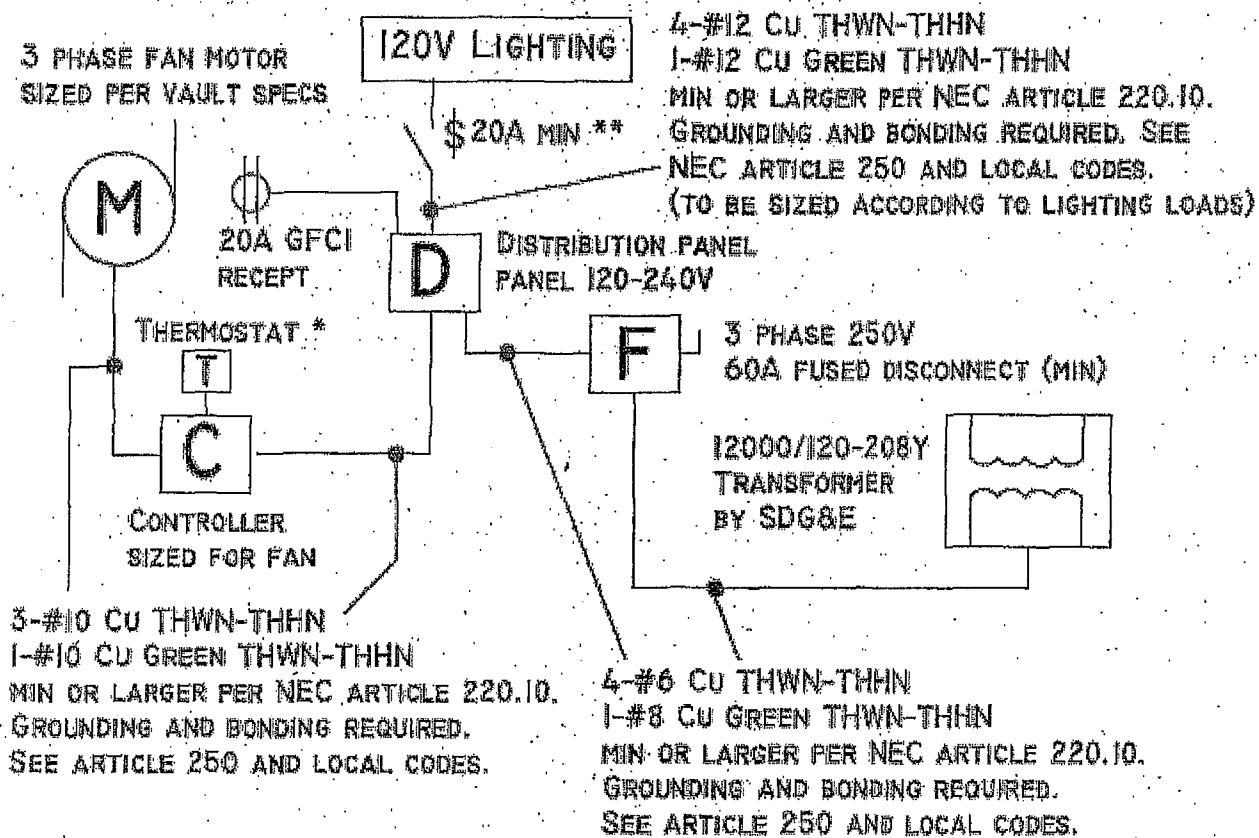
19. LOW VOLTAGE TERMINALS:

LOW VOLTAGE TERMINALS

KVA X-6 HOLES	KVA X-6 HOLES	KVA X-6 HOLES	KVA X-6 HOLES	VOLTAGE
	500	750	1000	208Y/120
750	1000	1500	2000 - 3000	*480Y/277

A MIN.	KVA	B MIN.	E
5±1/4"	75	6±1/4"	27±1/2"
5±1/4"	150	6±1/4"	27±1/2"
6±1/4"	225	8±1/4"	31±1/2"
6±1/4"	300	8±1/4"	31±1/2"
6±1/4"	500	8±1/4"	31±1/2"
6±1/4"	750	8±1/4"	46±1/2"
6±1/4"	1000 - 3000	8±1/4"	46±1/2"

20. INTERNAL VAULT WIRING

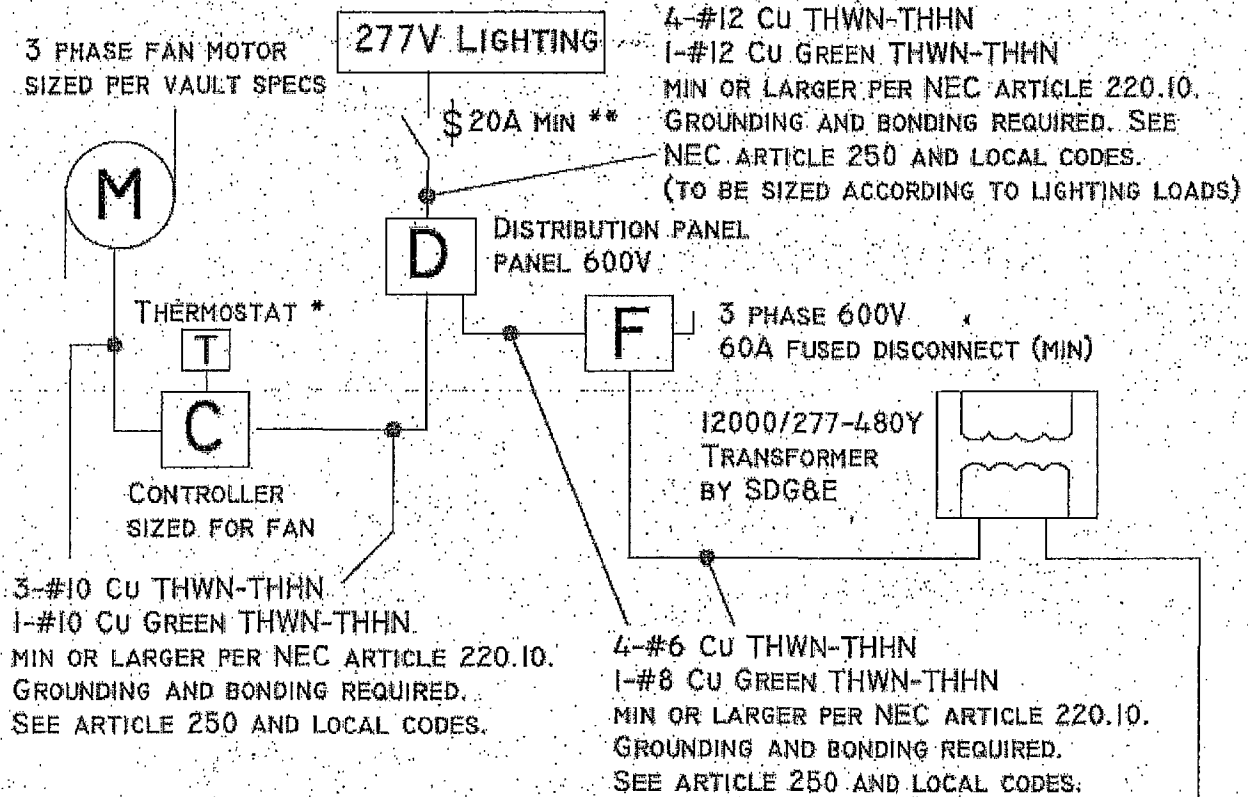


120-208V Vault

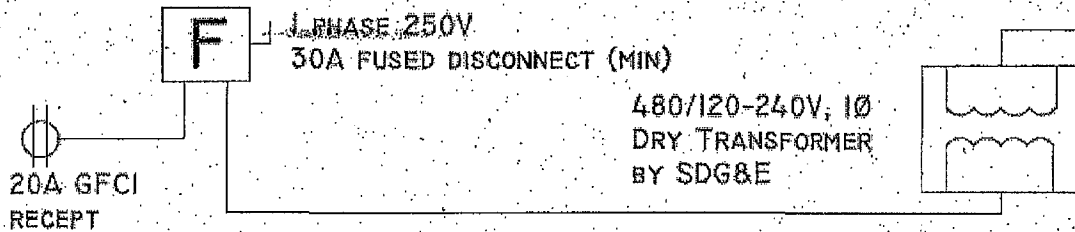
* THERMOSTAT TO BE MOUNTED AWAY FROM INTAKE AND EXHAUST VENTS IN ANY EASILY ACCESSIBLE LOCATION.

** LIGHT SWITCH WITH LIGHTED SWITCH PLATE REQUIRED INSIDE VAULT (A) ADJACENT TO PERSONNEL ACCESS DOOR AND (B) BELOW 34" CAST IRON COVER/PERSONNEL ACCESS OPENING, 48" ABOVE THE FLOOR.

NOTE: ANY MODIFICATIONS OR ADDITIONS TO THESE SPECIFICATIONS SHALL COMPLY WITH ALL APPLICABLE NEC AND LOCAL CODES.



277-480V Vault



120V Vault Power from 277-480 Y Transformer

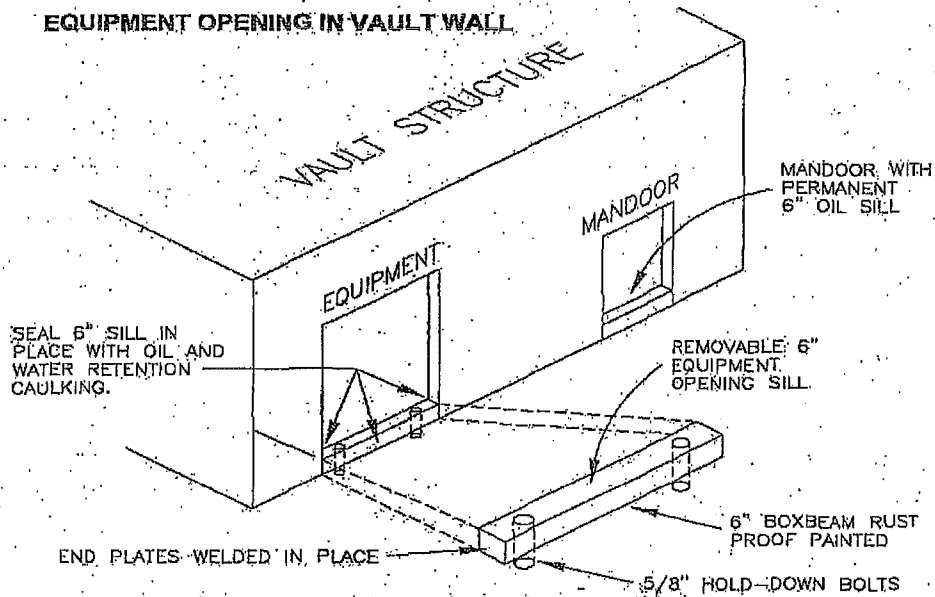
* THERMOSTAT TO BE MOUNTED AWAY FROM INTAKE AND EXHAUST VENTS IN ANY EASILY ACCESSIBLE LOCATION.

** LIGHT SWITCH WITH LIGHTED SWITCH PLATE REQUIRED INSIDE VAULT (A) ADJACENT TO PERSONNEL ACCESS DOOR AND (B) BELOW 34" CAST IRON COVER/PERSONNEL ACCESS OPENING, 48" ABOVE THE FLOOR.

NOTE: ANY MODIFICATIONS OR ADDITIONS TO THESE SPECIFICATIONS SHALL COMPLY WITH ALL APPLICABLE NEC AND LOCAL CODES.

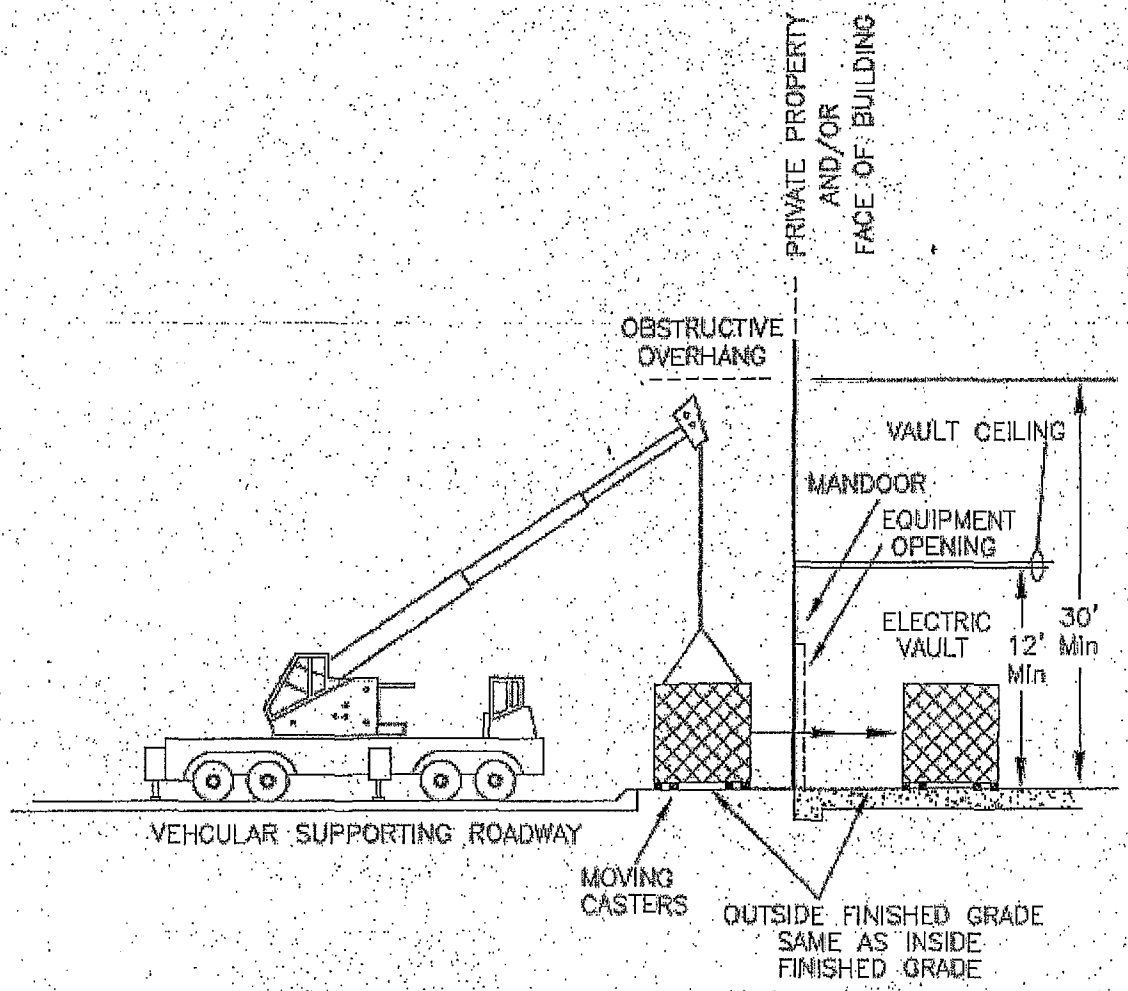
21. EQUIPMENT OPENINGS IN VAULT WALL:

- 21.1. 10' X 10 Door required for equipment opening. May be a roll-up door or conventional.
- 21.2. Either style door must be 3hr Fire Rated. See section 3.2 and 3.10.

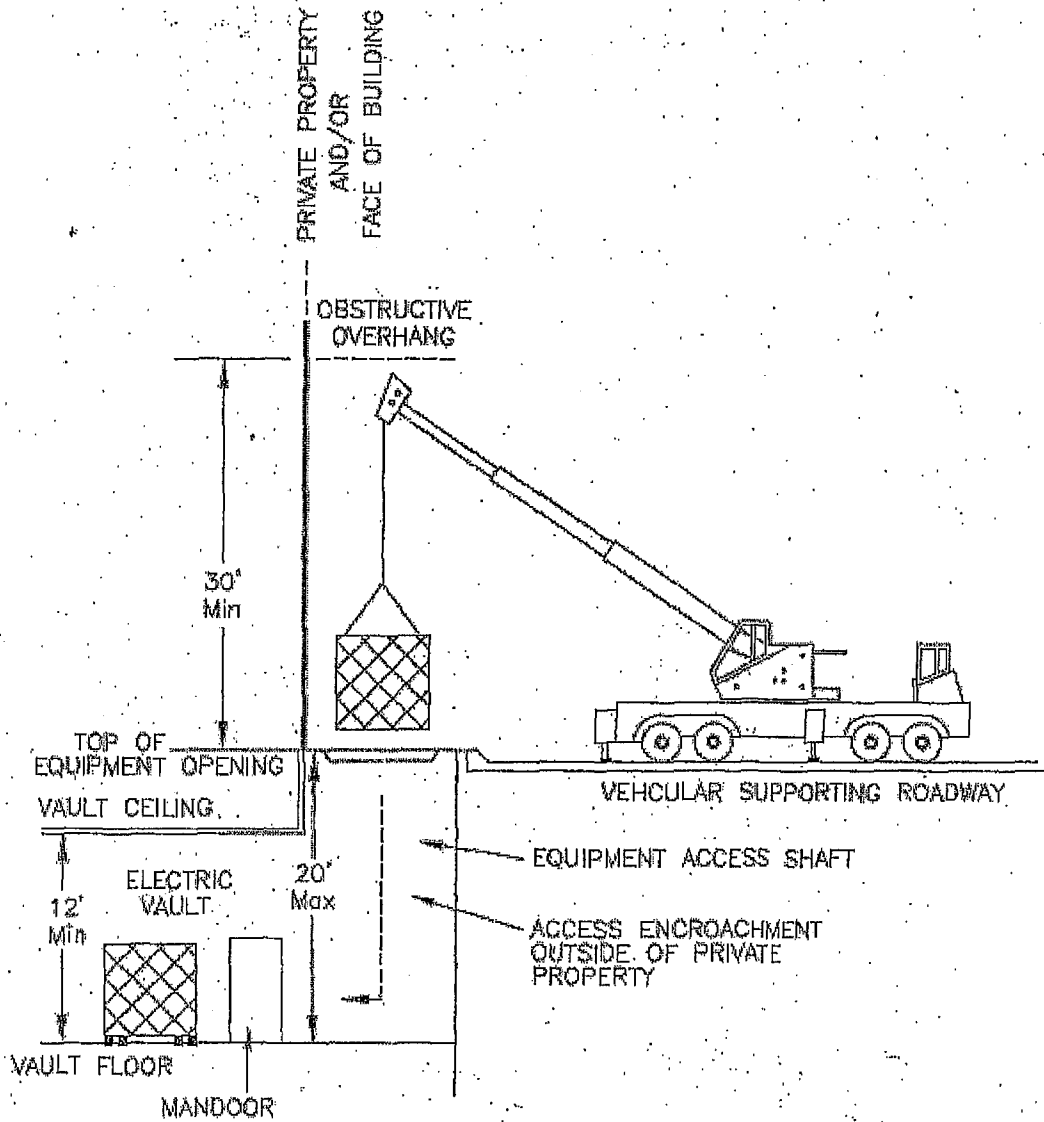


22. ELECTRIC VAULT LOCATION & ACCESSIBILITY:

22.1. On-Grade Vault (Preferred):



22.2. Below Grade Vault (Alternate):



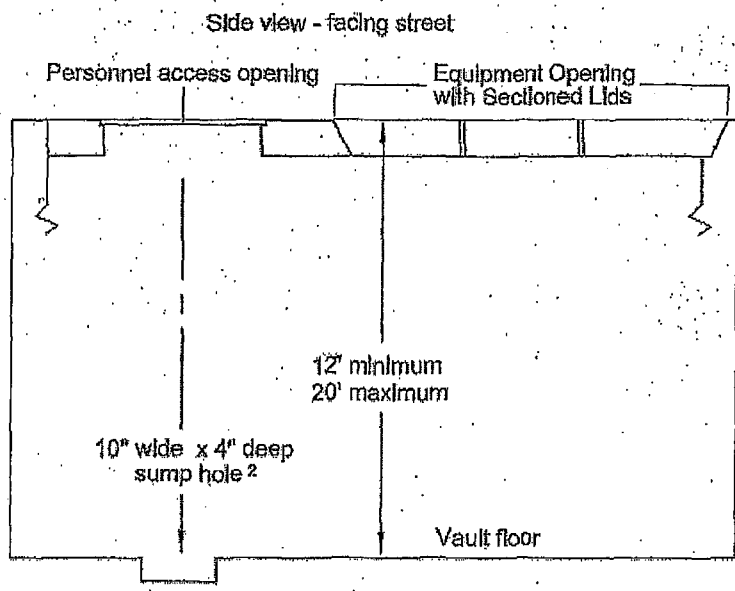
23. VAULT INTERNAL DIMENSIONS: BELOW GRADE & STREET LEVEL VAULTS

Customer Type	Number of Transformers (26.1)		Clear and unobstructed space (26.1/2/3/5)	Equipment opening & personnel access opening
	1Ø	3Ø		
Residential Only	1	1	18' X 16' (at grade)	(not required at grade)
	1	1	18' X 16' (below grade)	17' X 12' (min)
Commercial or Combination w/ Residential		1	20' X 44' (26.4)	17' X 12' (min) (not required at grade)
		2	36½' X 29' or 20' x 57'	17' X 12' (min) (not required at grade)
		3	20' x 70'	17' X 12' (min) (not required at grade)

- 23.1. Customer must contact SDG&E Project Management department to determine dimensions for transformer combinations not listed. Contact SDG&E prior to submitting architectural building plans for Municipal approval.
- 23.2. Customer desiring deviation from standard vault dimensions must make formal written request to SDG&E Project Management department for consideration. Requests must be submitted to SDG&E prior to submitting architectural building plans for Municipal approval.
- 23.3. If customer not able to provide clear & unobstructed space (no columns) in the dimensions specified above, please contact SDG&E Project Management department to determine acceptable alternative to prescribed dimensions above. Customer must coordinate with SDG&E prior to submitting architectural building plans for Municipal approval.
- 23.4. Customer may use 36½' x 29' dimensions if convenient.
- 23.5. Customer may provide larger vault than minimum dimensions listed above.

24. LADDER INSTALLATION FOR VAULTS GREATER THAN 12' (Below Grade)

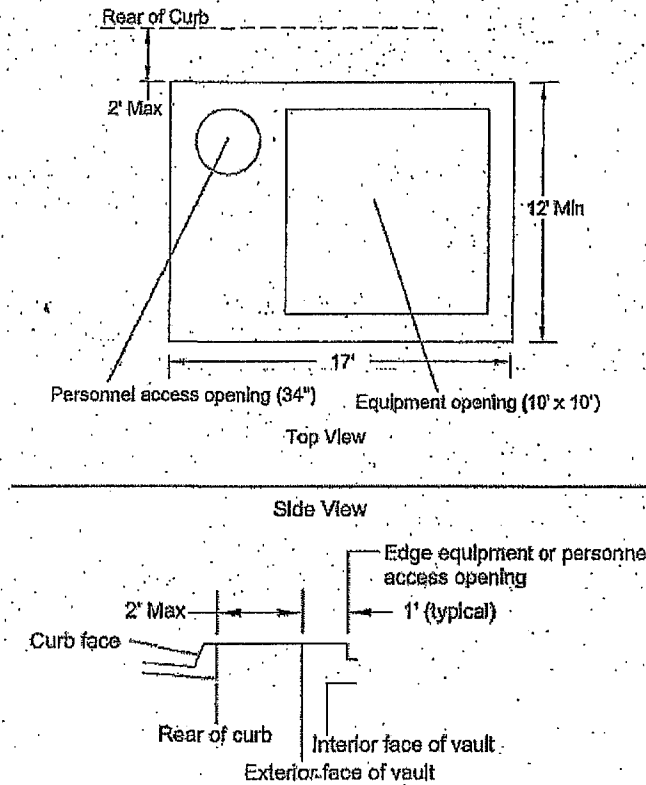
- 24.1. Minimum Vault Depth 12ft, Maximum Vault Depth 20ft.
- 24.2. Sump hole required, centered directly below personnel access opening
- 24.3. Installation of permanent ladder not required in personnel access opening, SDG&E will supply ladder when needed.



25. VAULT EQUIPMENT COVER and PERSONNEL ACCESS OPENING (Below Grade)

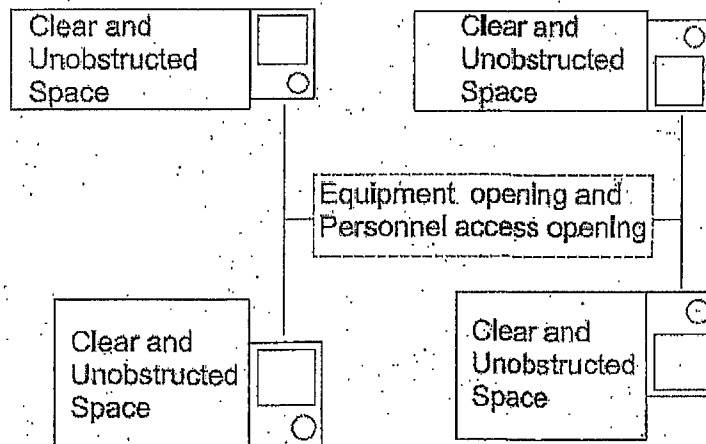
- 25.1. Inside dimension of equipment opening shall measure 10' x 10'. Customer shall provide removable 3-hour fire rated 3-part concrete equipment opening covers. No coverings or facades are permitted over these covers unless an integral part of the covers themselves. Maximum weight of each section is not to exceed 4,800 lbs.
- 25.2. Customer to provide 4 lifting inserts with removable plugs (to keep out debris) near each corner of each equipment opening cover/section. Lifting inserts shall be 1" threaded coil inserts with 4,500 lbs safe working load tension – see section 3 & 4.
- 25.3. Personnel access opening shall measure 30" with 34" cast iron cover and recessed stainless steel penta head bolts (4). See SDG&E Underground Standards page 3322. Personnel access opening to be at final grade. No coverings are permitted over this opening.
- 25.4. Customer to submit plans approved by a civil engineer registered in the State of California verifying the structural integrity of equipment opening covers and personnel access opening cover to withstand (AASHTO) HS-20 loading. Plans to be submitted to SDG&E prior to construction/manufacture of vault roof and sectioned equipment opening.
- 25.5. Café fences, railings, partitions, enclosures, screens, barriers, walls, tables, chairs, umbrellas, podiums, or any other miscellaneous structures or furniture are not permitted above equipment opening cover or personnel access opening cover, temporarily or otherwise. 24 hr access for emergency and/or routine removal of covers is to be maintained at all times.
- 25.6. Equipment opening covers and personnel access open cover to sit flush with and at same grade as surrounding sidewalk.
- 25.7. Customer shall install felt insulation between concrete equipment opening covers and metal side rails/struts - to prevent surface vacuum buildup between covers and side rails. Install felt insulation such that top horizontal surface of insulation is ½" – 1" below top surface of covers. Customer to seal perimeter of equipment opening covers with removable ultraviolet/water/oil resistant caulking

25.8. Equipment Opening & Personnel Access Opening shall be no more than 2ft from edge of curb.

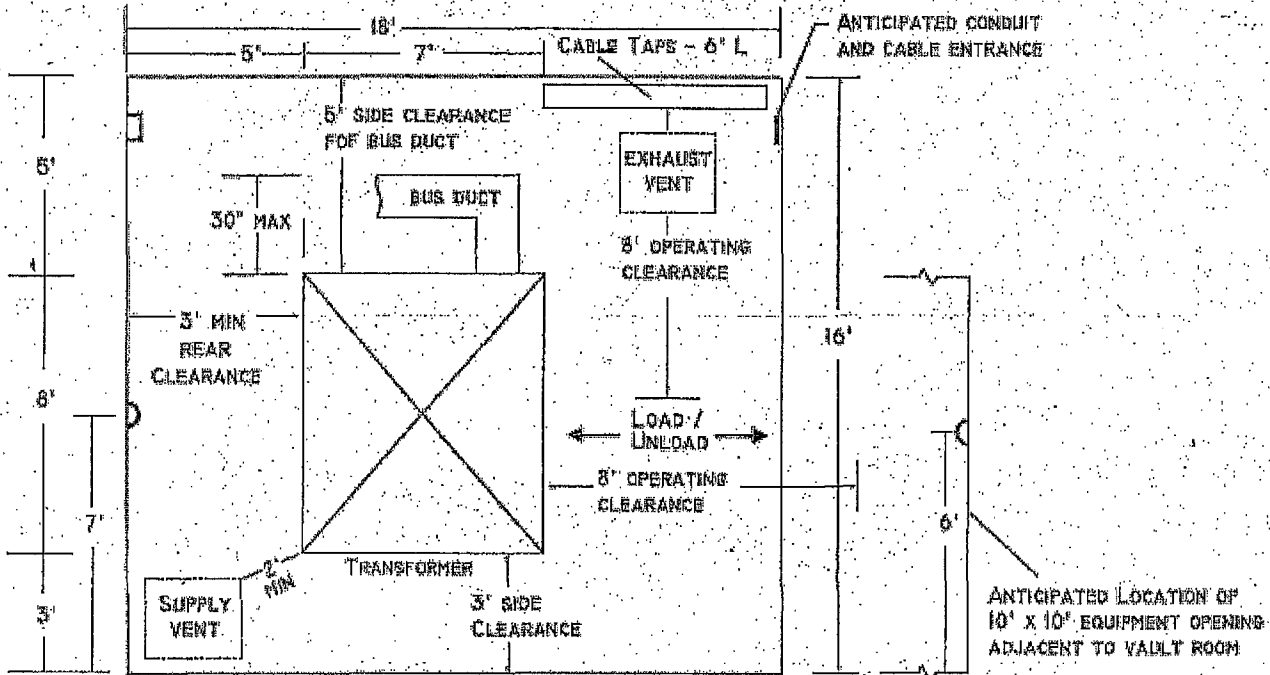


*Note: Customer is not permitted to install tables, chairs, partitions, posts, signs, screens, walls, fences, railings or barriers of any nature above or in front of SDG&E equipment opening or personnel access opening.

25.9. The following depiction shows typical arrangements of the "Clear & Unobstructed Space" (vault space for equipment) to the "Equipment and Personnel Access Opening".

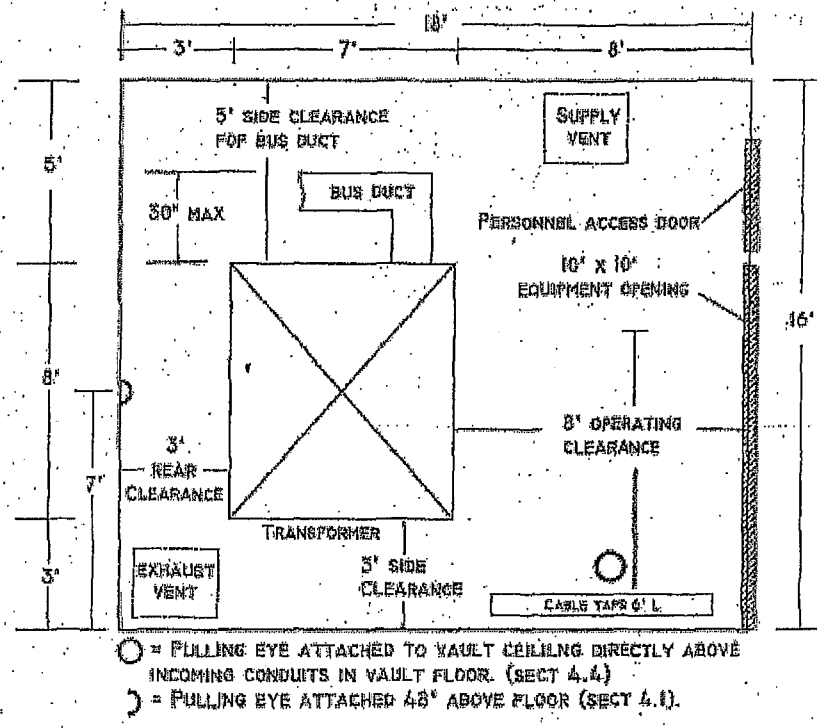


26. TYPICAL VAULT CONFIGURATIONS (AT & BELOW GRADE)

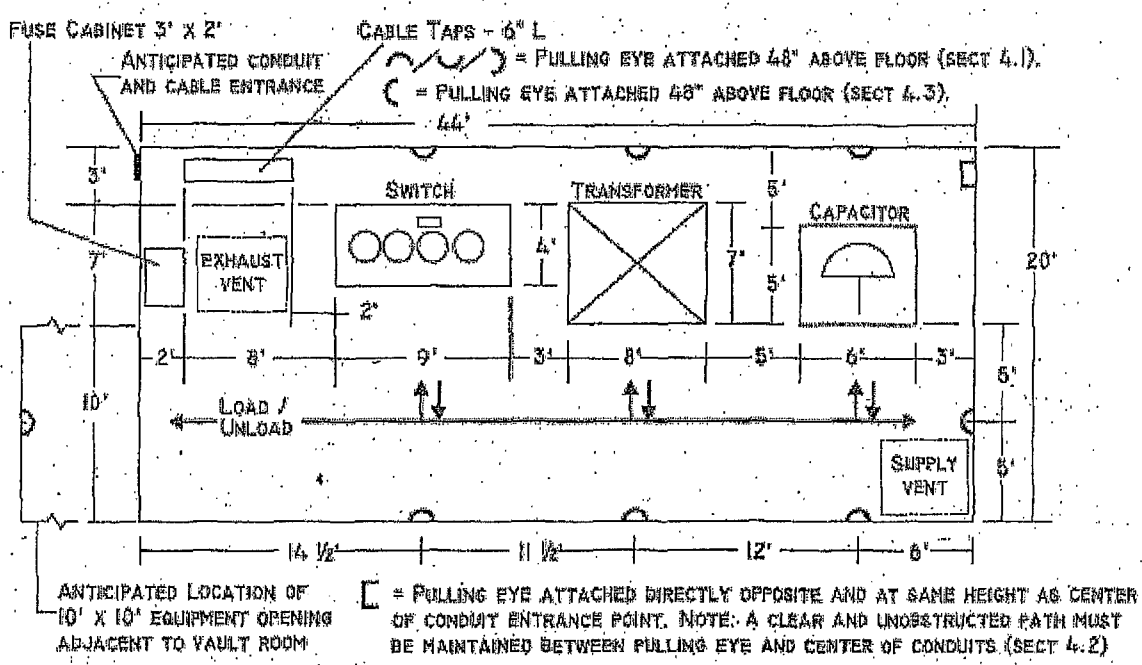


- ⌋ = PULLING EYE ATTACHED DIRECTLY OPPOSITE AND AT SAME HEIGHT AS CENTER OF CONDUIT ENTRANCE POINT. NOTE: A CLEAR AND UNOBSTRUCTED PATH MUST BE MAINTAINED BETWEEN PULLING EYE AND CENTER OF CONDUITS (SECT 4.2)
- ⌋ = PULLING EYE ATTACHED 48" ABOVE FLOOR (SECT 4.1)

Typical below grade residential vault configuration for one transformer

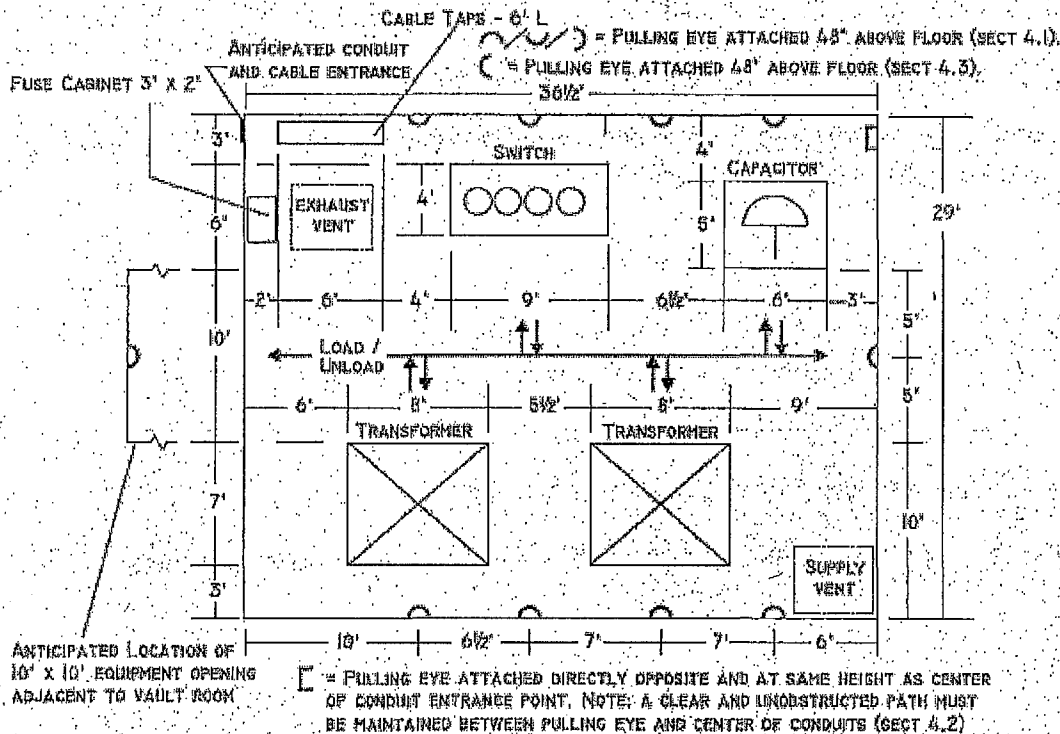
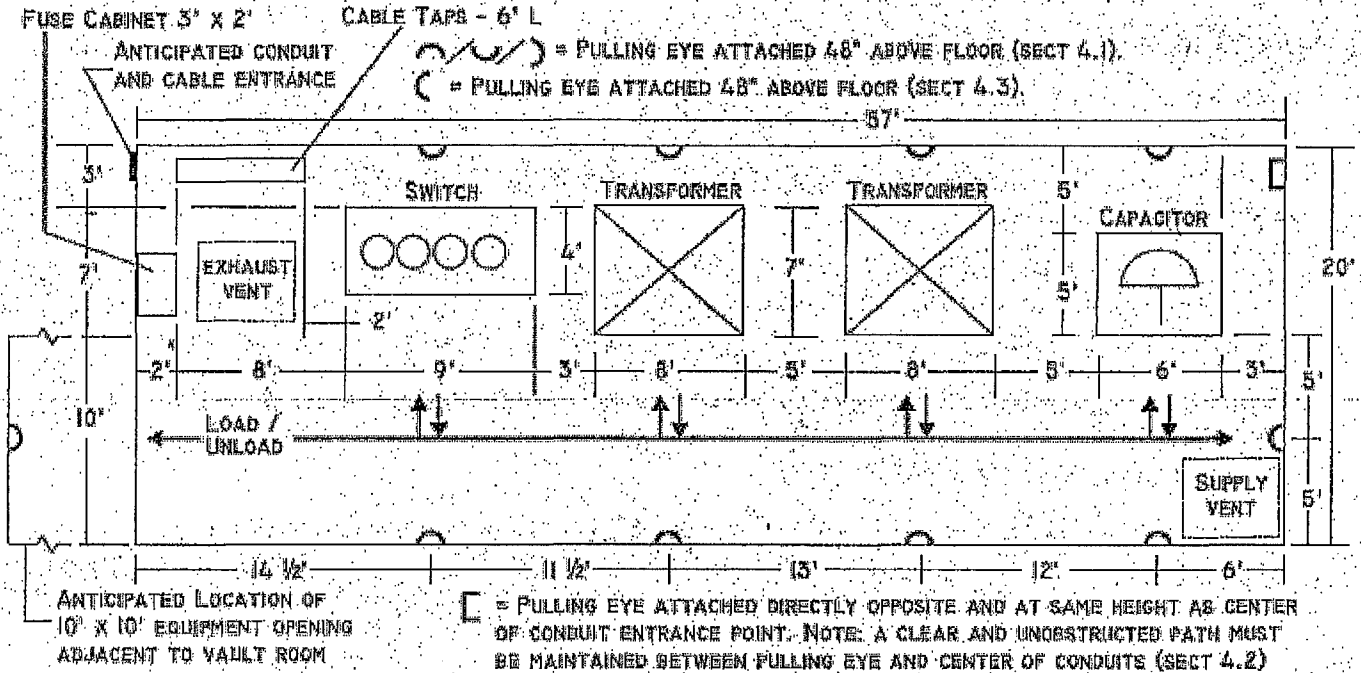


Typical at grade residential vault configuration for one transformer



Typical below grade commercial vault configuration for one transformer

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Issue
Revision Date
7/22/2010

**SDG&E
ELECTRIC VAULT
REQUIREMENTS AND SPECIFICATIONS**

Page 30 of 30

27: CONSTRUCTION & MAINTENANCE RESPONSIBILITIES:

The customer / owner shall furnish, construct and own the transformer vault facilities as specified. The customer / owner will be responsible for the maintenance of the vault facilities installed for the duration of service. This includes any portion of the vault structure extending into the public right-of-way, or outside of the project boundary.

The customer, owner or authorized representative agrees to provide, construct and maintain permanent truck & equipment access, and boom clearance for SDG&E's use at any equipment access opening located within the customer / owner's land. See section 3.6, 3.7, 3.8, 3.9 & 3.10 for specific requirements. Customer, owner or authorized representative also agrees to position equipment access opening that is adjacent to public right-of-way or in public right-of-way such that it provides the same access as when located within customer / owner's land. Access route shall be capable of supporting truck weight class H20 (20 tons per axle).

SDG&E will be represented in the field by an inspector and all work and material shall be subject at all times to inspection. Our inspector may be contacted prior to the start of your construction to answer any question you may have concerning your project. Final acceptance by SDG&E will be made when you have completed all work to the satisfaction of our inspector. The meters can only be set after final acceptance of your work, completion of our work, application for service, and receipt of final building inspection clearance.

All materials, work and work areas shall comply with the CAL-OSHA, Federal OSHA, and all other applicable federal, state, or local safety laws or rules that are necessary to protect applicant's and utility's employees, the public, and workers during the time of construction.

By proceeding with this installation, it is understood that you agree to all the stipulations set forth in these specifications and drawings indicated herein.

Customer / Owner _____ Date _____

Customer (print name) _____

Authorized customer representative _____ Date _____

Authorized customer representative (print name) _____

SDG&E representative _____ Date _____

SDG&E representative (print name) _____

DEVIATION REQUEST FOR GAS OR ELECTRIC CONSTRUCTION STANDARDS

DATE PREPARED: 7/20/2011	GAS DEVIATION REQUEST NUMBER:
-----------------------------	-------------------------------

REQUESTER (PLEASE PRINT) Jason Seiler	WORK LOCATION Century Park	PHONE NUMBER: 858-636-3992
DPSS PROJECT NUMBER 061621-010	PROJECT NAME Bayside Fire Station	
PROJECT LOCATION (STREET OR DESCRIPTIVE ADDRESS AND CITY) S/W corner of Cedar St & Pacific Coast Hwy	THOMAS BROTHERS 1288-J2	
DEVIATION FROM (check one):		
<input type="checkbox"/> GAS CONSTRUCTION STANDARD		<input checked="" type="checkbox"/> ELECTRIC CONSTRUCTION STANDARD
POLE/STRUCTURE NUMBER D2031971708	DEVIATION FROM STANDARD PAGE NUMBER 3703.1	

REASON FOR DEVIATION: (PLEASE INCLUDE SKETCH - ATTACH SEPARATE SHEET IF NECESSARY)

Standard page 3703.1 & .2 require deviation when installing subsurface transformers. We are planning on moving existing padmount open delta station from the street into a new vault. The open delta would be directly in front of the new Fire Station driveway and we do not have room to install the transformers in the franchise. Please see attached sketch and map.

COMMENTS FROM: (CHECK ONE FOR GAS OR ELECTRIC)

FOR GAS:	<input type="checkbox"/> GENERAL FORMAN	AND/OR	<input type="checkbox"/> GAS METER SUPERVISOR
FOR ELECTRIC	<input checked="" type="checkbox"/> GENERAL FOREMAN		
SIGNATURE: Jose Meza	Date: 8/3/11	Phone: 619 572 7250	

COMMENTS:
The vault looks good

ENGINEERING REVIEW (CHECK APPROVING SECTION)

<input type="checkbox"/> Gas Codes and Compliance	<input type="checkbox"/> OH Electric Standards	<input checked="" type="checkbox"/> UG Electric Standards
DEVIATION REQUEST IS:	<input checked="" type="checkbox"/> APPROVED	<input type="checkbox"/> DENIED

COMMENTS/PROVISIONS/RECOMMENDATIONS:
OK to install HSS XFMR relocation in new structure on site.

GAS ENGINEERING MANAGER/STANDARDS ANALYST: TJ. REGE	Date: 8/10/11.
---	----------------

ROUTE	<input type="checkbox"/>	GAS-ORIGINATOR/GAS GENERAL FOREMAN/GAS STANDARDS/GAS ENGINEERING MANAGER/ORIGINATOR
	<input type="checkbox"/>	ELECTRIC OH-GENERAL FOREMAN/OH STANDARDS/ORIGINATOR
	<input type="checkbox"/>	ELECTRIC UG- UG GENERAL FORMAN/UG STANDARDS/ORIGINATOR

APPENDIX I

ASBESTOS CONTAINING MATERIALS AND LEAD BASED PAINT SURVEY

***A*dvantage *E*nvironmental
*C*onsultants, LLC**

ASBESTOS CONTAINING MATERIALS AND LEAD-BASED PAINT SURVEY

Bayside Fire Station
1595 Pacific Highway
San Diego, California 92101

AEC Project No. 10-069SD
December 29, 2010

Prepared for:

Centre City Development Corporation
401 B Street, Suite 400
San Diego, CA 92101

Prepared by:

Advantage Environmental Consultants, LLC
145 Vallecitos De Oro, Suite 201
San Marcos, California 92069
Phone (760) 744-3363 • FAX (760) 744-3383

December 29, 2010

Mr. John Collum
Senior Project Manager
Centre City Development Corporation
401 B Street, Suite 400
San Diego, CA 92101

Subject: **Asbestos Containing Materials (ACM) and Lead-Based Paint (LBP) Survey
Bayside Fire Station
1595 Pacific Highway
San Diego, California 92101
AEC Project #10-069SD**

Dear Mr. Collum:

Advantage Environmental Consultants, LLC (AEC) has performed an ACM and LBP Survey of the Bayside Fire Station property, located at 1595 Pacific Highway, in San Diego, California. The work was performed in accordance with the terms and conditions of CCDC Agreement Number CC3000003532 between AEC and CCDC. The following report describes the survey protocol, sampling procedures and laboratory results of the materials tested. AEC has provided conclusions and recommendations based on the results of the survey.

We appreciate the opportunity to be of continued service to the Centre City Development Corporation. If you should have any questions regarding this report, please contact Dan Weis at (760) 744-3363.

Sincerely,

ADVANTAGE ENVIRONMENTAL CONSULTANTS, LLC



Daniel Weis, R.E.H.S., REA
Branch Manager
Western Regional Office



John Payne
Certified Asbestos Consultant

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APPENDIX A	Bulk Sampling Log and Asbestos Laboratory Analytical Results and Chain of Custody
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1.0 Purpose and Methodology

The purpose of the Asbestos Containing Materials (ACM) and Lead-Based Paint (LBP) survey was to locate and identify accessible friable and non-friable suspect ACMs and LBP painted surfaces at the subject property located at 1595 Pacific Highway, in downtown San Diego, California. The property is further identified by County of San Diego Assessor's Parcel Numbers (APNs) 533-321-01-00 and 533-321-02-00. Based on information obtained from the San Diego County Assessor's Office, the legal parcels that comprise the subject property are approximately 10,000 square feet in size, with the 533-321-01-00 parcel developed with a 1,937 square foot store/restaurant building. Other improvements at the property include concrete and asphalt paving, landscaping, a drive-through sign, a cooling tower associated with the site structure, a dumpster enclosure, various utility systems and other improvements. It is our understanding that the site is currently owned by the Redevelopment Agency of the City of San Diego (RDA) and that it is the intention of Centre City Development Corporation (CCDC), on behalf of the RDA, to retain contractors to demolish the existing site structure and other existing improvements as part of the development of Fire Station No. 2 – Bayside.

A State of California Certified Asbestos Consultant and United States Environmental Protection Agency (USEPA) certified building inspector for Asbestos-Containing Building Materials and a California Department of Health Services Certified Lead Inspector/Assessor performed the inspection on September 23, 2010. Potential ACM and LBP identification was performed by entering each functional space and assessing structural/mechanical components and architectural finishes. The physical conditions, friability, accessibility, activity and damage of suspect ACM was also assessed and documented.

The LBP survey was accomplished by entering each room equivalent. A room equivalent is an identifiable part of a building such as a room, office, hallway, staircase, foyer and exteriors. Readings were obtained from each building component identified within each room equivalent by the use of a hand held X-Ray Fluorescence (XRF) lead-based paint analyzer. Each reading location and condition of paint was documented.

The ACM survey methodology is summarized below:

- Each suspect ACM identified during the survey was sampled in accordance with sampling guidelines established by the USEPA. The following summarizes the sampling procedures utilized:
- Building materials were categorized into homogeneous materials. A homogeneous material is defined as being uniform in texture, color, and date of application.
- A sampling scheme was developed based upon the location and quantities of the various homogeneous materials.
- Bulk samples were collected by extracting a representative section of the selected material, placing it in a sampling container and assigning a unique sample number. The samples were placed into a sealed shipping container for delivery to an accredited laboratory for analysis by polarized light microscopy (PLM).

- The personnel performed proper decontamination procedures to prevent the spread of secondary contamination.

Each bulk sample was recorded on a bulk sample log and possession of the samples was tracked by a chain of custody record. The laboratory analyzed the building material samples and reported results in accordance with State of California protocol. The lower limit of reliable detection for this method is 1%. Samples that contain more than 1% of asbestos are reported in 5% ranges. Samples which contain asbestos in a concentration lower than the limit of reliable detection (<1%) are considered "Trace."

All bulk samples were analyzed by PLM in accordance with the "Interim Method for the Determination of Asbestos in Bulk Insulation Samples EPA - 600/M4-82-020" dated December 1982 and adopted by the National Voluntary Laboratory Accreditation Program (NVLAP) Title 15, part 7 of the Code of Federal Register as affiliated with the National Institute for Standards and Testing (NIST).

Fourteen bulk samples were obtained at the subject building and analyzed for asbestos content by Forensic Analytical of Rancho Dominguez, California. Forensic Analytical is accredited by the American Industrial Hygiene Association, NVLAP, NIST, and is a successful participant in the Proficiency Analytical Testing Program (PAT).

The LBP survey methodology is summarized below:

As stated previously, LBP readings were collected utilizing an XRF analyzer. Readings were collected in accordance with Chapter 7 of the HUD Guidelines for Evaluation and Control of Lead-Based Paint Hazards in Housing and USEPA 40 CFR part 745 and Title X of the 1992 Housing and Community Development Act. A total of 29 XRF readings were obtained during the survey.

The California Department of Health Services standard for the definition of LBP is 5,000 parts per million (ppm) or 1.0 milligram per square centimeter (mg/cm²). However, under City of San Diego Ordinance 19732, contractors are required to use lead-safe work practices when disturbing lead paint that contains lead concentrations equal or greater than 1,000 ppm or 0.5 mg/cm² on all pre-1979 buildings. In addition, the California Occupational Safety and Health Administration (Cal-OSHA) requires that all workers be properly protected when working with materials containing any detectable levels of lead in accordance with Title 8 CCR Section 1532.1.

2.0 Findings

ASBESTOS-CONTAINING MATERIALS AND LEAD-BASED PAINT SURVEY

Eight of the fourteen building material samples obtained during the survey tested positive for ACM and are noted in the table below:

POSITIVE ASBESTOS SAMPLE RESULTS AND LOCATIONS

Material	Sample Number	Asbestos Content	Location of Material	Friable	Damage
Black Vinyl Floor Tile and Mastic	06 07	Tile - 3% Chrysotile Mastic - Non Detected	Throughout Second Floor (Underlying Layer)	No	No
Vinyl Sheet Flooring	08	Brown Mastic - Trace Anthophyllite	Second Floor Restroom	No	No
Baseboard and Mastic	09	Brown Mastic - Trace Anthophyllite	Throughout Second Floor	No	No
Exterior Stucco	10 11 12	Trace Chrysotile	Throughout Exterior	No	No
Roof Penetration Mastic	14	5% Chrysotile	Throughout Roof	No	No

The remaining 6 building material samples obtained during the survey tested negative for ACM and are noted in the table below:

NEGATIVE ASBESTOS SAMPLE RESULTS AND LOCATIONS

Material	Sample Number	Location of Material	Friable	Damage
Interior Plaster	01 02 03	Throughout Interior	No	No
Vinyl Sheet flooring	04 05	Throughout Second Floor (Top Layer)	Yes	No
Roofing Felt	13	Throughout Roof	No	No

The bulk sample log and analysis report, located in Appendix A, contains a listing of all analyzed samples, sample locations, and analytical results. Results are reported in percent asbestos by volume and indicate the type(s) of asbestos. Other common non-asbestos components may also be noted on the analytical report.

A hazard assessment of ACM identified during the survey is presented in the table below. For the purposes of the hazard assessment, good condition represents material that shows little or

no damage and requires no remedial action if left in place, moderate condition represents material that is somewhat damaged and is in need of minor repairs and a significantly damaged designation represents material that is in need of immediate remedial action. As shown in the table, the ACM identified during the survey is noted as being in good condition.

HAZARD ASSESSMENT OF ACM MATERIALS

Material	Location of Material	Condition
Black Vinyl Floor Tile and Mastic	Throughout Second Floor (Underlying Layer)	Good
Vinyl Sheet Flooring	Second Floor Restroom	Good
Baseboard and Mastic	Throughout Second Floor	Good
Exterior Stucco	Throughout Exterior	Good
Roof Penetration Mastic	Throughout Roof	Good

LEAD-BASED PAINT SAMPLE RESULTS AND LOCATIONS

Seven of the 29 building component surfaces analyzed for lead were found to contain lead at concentrations greater than 0.5 mg/cm². The 29 painted surfaces and/or building components analyzed during the survey are noted in the table below:

Sample Number	Location	Component	Substrate	Color	Condition	Pb mg/cm ²
NA	----	Calibration	----	----	----	1.0
NA	----	Calibration	---	---	----	1.0
NA	---	Calibration	---	---	---	1.1
1	Exterior	Wall	Stucco	Yellow	Good	0.00
2	Exterior	Wall	Stucco	Brown	Good	0.00
3	Exterior	Wall	Stucco	Green	Good	0.00
4	Exterior	Wall	Stucco	Yellow	Good	0.02
5	Exterior	Post	Wood	Brown	Good	0.00
6	Exterior	Post	Wood	Brown	Good	0.01
7	Exterior	Post	Wood	Brown	Good	0.00
8	Exterior	Post	Wood	Brown	Good	0.01
9	Exterior	Handrail	Metal	Green	Good	0.02
10	Exterior	Door	Metal	Green	Good	0.00
11	Exterior	Door Jamb	Metal	Green	Good	0.00
12	Interior	Wall	Plaster	Yellow	Good	0.02
13	Interior	Wall	Plaster	Yellow	Good	0.00
14	Interior	Wall	Plaster	Yellow	Good	0.01
15	Interior	Wall	Plaster	Yellow	Good	0.02
16	Interior	Door	Wood	White	Good	0.02
17	Interior	Floor	Ceramic Tile	Red	Good	0.02
18	Interior	Floor	Ceramic Tile	Red	Good	0.01
19	Interior	Floor	Ceramic Tile	Red	Good	0.02

20	Interior	Floor	Ceramic Tile	Red	Good	0.02
21	Interior	Wall	Ceramic Tile	White	Good	1.2
22	Interior	Wall	Ceramic Tile	Blue	Good	1.1
23	Interior	Wall	Ceramic Tile	Red	Good	1.2
24	Interior	Door	Wood	Brown	Good	0.02
25	Interior	Door Jamb	Metal	White	Good	0.01
26	Interior-Kitchen	Wall	Ceramic Tile	White	Good	1.2
27	Interior-Kitchen	Wall	Ceramic Tile	White	Good	1.2
28	Interior-Kitchen	Wall	Ceramic Tile	White	Good	1.1
29	Interior-Kitchen	Wall	Ceramic Tile	White	Good	1.2

3.0 Conclusions and Recommendations

AEC is providing the following conclusions and recommendations based on the results of the ACM and LBP survey:

- It is AEC's opinion that the ACM identified during this survey can be managed in place under an Asbestos Operations and Maintenance (O&M) Plan. The ACM identified is in good condition, and not likely to pose an environmental and/or public health risk as long as the material is maintained in its present condition. However, it is our understanding that the site structure will be slated for demolition as part of the Bayside Fire Station redevelopment project. Thus, drafting of a site specific O&M plan prior to demolition is not considered to be worth the expense to the client. If plans for the project change and the site structure is to remain in its current condition, then an asbestos related O&M plan would be deemed to be beneficial.
- All ACM (above trace levels) must be removed if it is to be disturbed during remodeling or demolition. This includes black vinyl sheeting (underlying layer) on the second level of the site structure and roof penetration mastic. Current federal and state regulations require any repair, renovation and/or demolition of any ACM should be conducted only by workers and/or contractors who have been properly trained in the correct handling of ACM. All asbestos work should be accomplished under the direction of an Independent State Certified Asbestos Consultant with oversight performed by a State Certified Site Surveillance Technician. The ACM must be disposed of at an approved facility licensed to handle such waste.
- If building materials containing trace levels of ACM (greater than 0.1% but less than 1%) are to be affected by demolition or renovation activities, they can be demolished in place and disposed of as general construction debris. Such materials relative to the subject property include exterior stucco, second floor vinyl sheet flooring (bathroom) and second floor baseboard and mastic. However, any repair, renovation and/or demolition of such material should also be conducted by workers and/or contractors who have been properly trained in the correct handling of ACM and under the direction of an Independent State Certified Asbestos Consultant and Site Surveillance Technician.
- The OSHA Construction Asbestos Standard requires building and/or facility owners to notify the following persons of the presence, location and quantity of ACM or material presumed to be ACM, at the work sites in their buildings and facilities:
 - (A) Prospective employers applying or bidding for work whose employees reasonably can be expected to work in or adjacent to areas containing such material;
 - (B) Employees of the owner who will work in or adjacent to areas containing such material;
 - (C) On multi-employer worksites, all employers of employees who will be performing work within or adjacent to areas containing such materials; and
 - (D) Tenants who will occupy areas containing such material.
- LBP was identified on seven building materials tested during the investigation and includes red, white and blue ceramic tile throughout the ground floor of the site structure. Such

ceramic materials should be removed and properly disposed during future demolition activities or renovation work (if applicable). The tile must be removed by an abatement contractor licensed to handle and dispose of such materials. Additional sampling and analysis of the building materials (i.e. Toxicity Characteristic Leaching Procedure or "TCLP" analysis) at the site may also be conducted by the demolition/abatement contractor for waste profiling purposes and such sampling will depend on the disposal facility that the selected contractor chooses to deliver the material. The LBP identified during this survey is not likely to pose an imminent environmental and/or public health risk in its current state.

- AEC recommends that as part of the bid process for demolition of the existing structure at the site, this document should be provided to prospective demolition contractors so that the abatement of ACM and LBP painted surfaces can be incorporated in to such contractor bids. It is the contractor's responsibility to confirm ACM and LBP locations and quantities prior to bid submittals. In addition, the demolition contractor will also be responsible for the confirmation and removal of any building materials falling under the category of Universal Waste, which would include, but not be limited to potential Freon containing air conditioning units and refrigerators, potential PCB-containing light ballasts, potential tritium-containing exit signs and potential mercury-containing thermostats, switches, and fluorescent light tubes.

AEC warrants that our services are performed within the limits prescribed by our client with the usual thoroughness and competence of the engineering profession. Any recommendations in this report are professional opinions based solely on visual observations and analytical analyses, as described in this report. Because the scope of services was limited to accessible and visible suspect ACM, potential LBP, and intrusive investigative techniques were not contracted for, it is possible that unrecognized ACM and LBP might exist. Any unassessed materials present in inaccessible locations and areas that were not visible during the survey (if encountered at a later time) must be sampled for ACM or LBP prior to disturbance. Opinions and recommendations presented herein apply to site conditions existing at the time of our investigation and cannot necessarily apply to site changes of which this office is not aware and/or has not had the opportunity to evaluate.

APPENDIX A

Bulk Sampling Log and Asbestos Laboratory Analytical Results and Chain of Custody

ADVANTAGE ENVIRONMENTAL CONSULTANTS, LLC
 145 Vallecitos De Oro, Suite 201
 San Marcos, California 92069

ASBESTOS BULK SAMPLE LOG Page 1 of 2

Client Name: CCDC

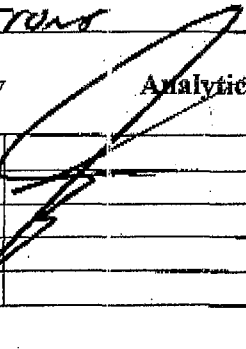
Project Location: 1595 Pacific Highway S.D

Date: 9-23-10 Field Technician: John Payne

Project Number: 10-1844 Priority: ASAP 24 HR 3-5 Days

SAMPLE NUMBER	SAMPLE LOCATION	MATERIAL DESCRIPTION	SQUARE FOOTAGE
01	Kitchen	Interior Plaster	
02	Main Area	↓	
03	2nd Floor	↓	
04	2nd Floor	Unpainted Floor	
05	2nd Floor	↓	
06	2nd Floor Black	Unpainted Floor Tile	
07	2nd Floor	↓	
08	2nd Floor PAPER	Unpainted Floor	
09	2nd Floor	BASIN BOARD Mastic	
10	Front	Interior Skilled	

Chain of Custody Analytical Method: PLM: TEM: Other:

Sampled By		Date	Time
Relinquished By		Date	Time
Received By		Date	Time
Relinquished By		Date	Time
Received By		Date	Time

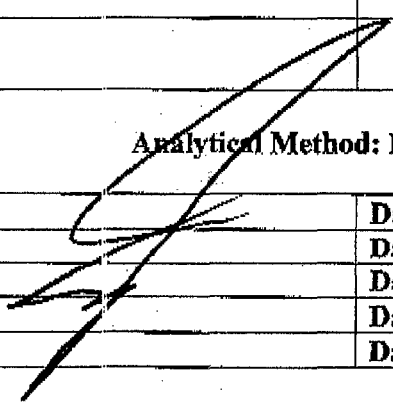
ADVANTAGE ENVIRONMENTAL CONSULTANTS, LLC
 145 Vallecitos De Oro, Suite 201
 San Marcos, California 92069

ASBESTOS BULK SAMPLE LOG Page 2 of 2

Client Name: CEOC
 Project Location: 1595 Pacific Highway S.P
 Date: 9-23-10 Field Technician: John Ryan
 Project Number: 10-1844 Priority: ASAP 24 HR 3-5 Days

SAMPLE NUMBER	SAMPLE LOCATION	MATERIAL DESCRIPTION	SQUARE FOOTAGE
11	Back	Fertilizer spread	
12	Side	↓ ↓	
13	Roof	Flit	
14	Roof	massic	

Chain of Custody Analytical Method: PLM: TEM: Other:

Sampled By		Date	Time
Relinquished By		Date	Time
Received By		Date	Time
Relinquished By		Date	Time
Received By		Date	Time

Client Name: Ambient Environmental Inc

Report Number: B140193
Date Printed: 09/28/10

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
06	50598744	Chrysotile	3 %				
			ND				
		Total Composite Values of Fibrous Components:		Asbestos (3%)			
		Cellulose (Trace)					
07	50598745	Chrysotile	3 %				
			ND				
		Total Composite Values of Fibrous Components:		Asbestos (3%)			
		Cellulose (Trace)					
08	50598746		ND				
		Anthophyllite	Trace				
		Total Composite Values of Fibrous Components:		Asbestos (Trace)			
		Cellulose (Trace)					
09	50598747		ND				
			ND				
		Anthophyllite	Trace				
		Total Composite Values of Fibrous Components:		Asbestos (Trace)			
		Cellulose (Trace)					
10	50598748		ND				
		Chrysotile	Trace				
		Total Composite Values of Fibrous Components:		Asbestos (Trace)			
		Cellulose (Trace)					
		Comment: This comment applies to the Off-White Cementitious Material only: Due to small sample size, this result may not be repeatable.					
11	50598749		ND				
			ND				
		Chrysotile	Trace				
		Total Composite Values of Fibrous Components:		Asbestos (Trace)			
		Cellulose (Trace)					
		Comment: This comment applies to the Off-White Cementitious Material only: Due to small sample size, this result may not be repeatable.					
12	50598750		ND				
		Chrysotile	Trace				
		Total Composite Values of Fibrous Components:		Asbestos (Trace)			
		Cellulose (Trace)					
		Comment: This comment applies to the Off-White Cementitious Material only: Due to small sample size, this result may not be repeatable.					

Client Name: Ambient Environmental Inc

Report Number: B140193
Date Printed: 09/28/10

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
13	50598751						
		Layer: Stones			ND		
		Layer: Black Tar			ND		
		Layer: Black Felt			ND		
		Total Composite Values of Fibrous Components:		Asbestos (ND)			
		Fibrous Glass (45 %)					
14	50598752						
		Layer: Black Semi-Fibrous Tar		Chrysotile	5 %		
		Total Composite Values of Fibrous Components:		Asbestos (5%)			
		Cellulose (Trace)					



Steven Takahashi, Laboratory Supervisor, Rancho Dominguez Laboratory

Note: Limit of Quantification (LOQ) = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Analytical results and reports are generated by Forensic Analytical Laboratories Inc. (FALI) at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by FALI to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by FALI. The client is solely responsible for the use and interpretation of test results and reports requested from FALI. Forensic Analytical Laboratories Inc. is not able to assess the degree of hazard resulting from materials analyzed. FALI reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. All samples were received in acceptable condition unless otherwise noted.

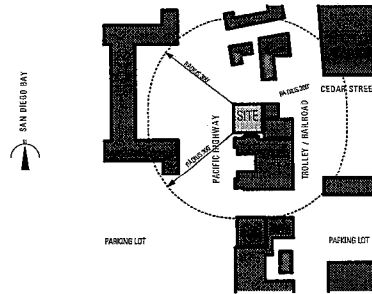
APPENDIX J

PUBLIC ARTWORK CONSTRUCTION PLANS AND SPECIFICATIONS

PROJECT INFORMATION

OWNER: Redevelopment Agency of the City of San Diego
DEVELOPER: Civic San Diego
ASSESSOR'S PARCEL NUMBER: 533-321-01 and 533-321-02
LEGAL DESCRIPTION: Lots 1 and 2 in Block 288 of Middletown, in the City of San Diego, County of San Diego State of California, according to map thereof made by A.B. Jackson, on file in the Office of the County Clerk of San Diego County, Map No. 533-97
PROJECT DESCRIPTION: Construct Public Artwork for Fire Station #2 (Bayside)
ZONE: Commercial/Office (1992 PDC)
NEIGHBORHOOD: Little Italy District
LAND USE: Commercial/Office (1992 PDC)
LAND USE OVERLAY DISTRICT: The Pacific Highway-County Administration Center Design Zone

VICINITY MAP



INDEX

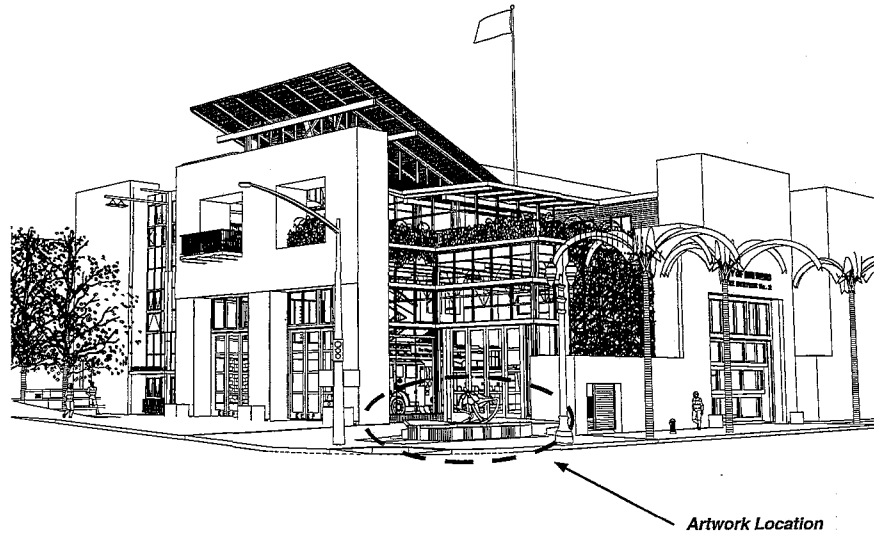
0.0 Title Sheet

Architecture

- 1.1 Site Plan
- 1.2 Visualization - Top View & Elevation
- 1.3 Detailed Top View & Section Cut
- 1.4 Longitudinal Section
- 1.5 Details
- 1.6 Interconnect Drawing for Audio Components

Structural Engineering

- 1.7 Structural - General Notes
- 1.8 Structural - General Notes
- 1.9 Structural Details



NOT FOR CONSTRUCTION OR FABRICATION

Fire Station #2 (Bayside) Artwork TITLE SHEET 0.0
 Chuck Moffit, Ingram Ober, Marisol Rendon

Public Artwork for Fire Station No.2 (Bayside)

EXISTING STRIP

- 1. ARTWORK
- 2. Concrete Inlay, on Building plan set

NOTES:

All stainless steel (SST plate) to be brushed stainless steel.

All terrazzo is Western States Terrazzo Association 7A-G(deep rose) or 8A-G(red).

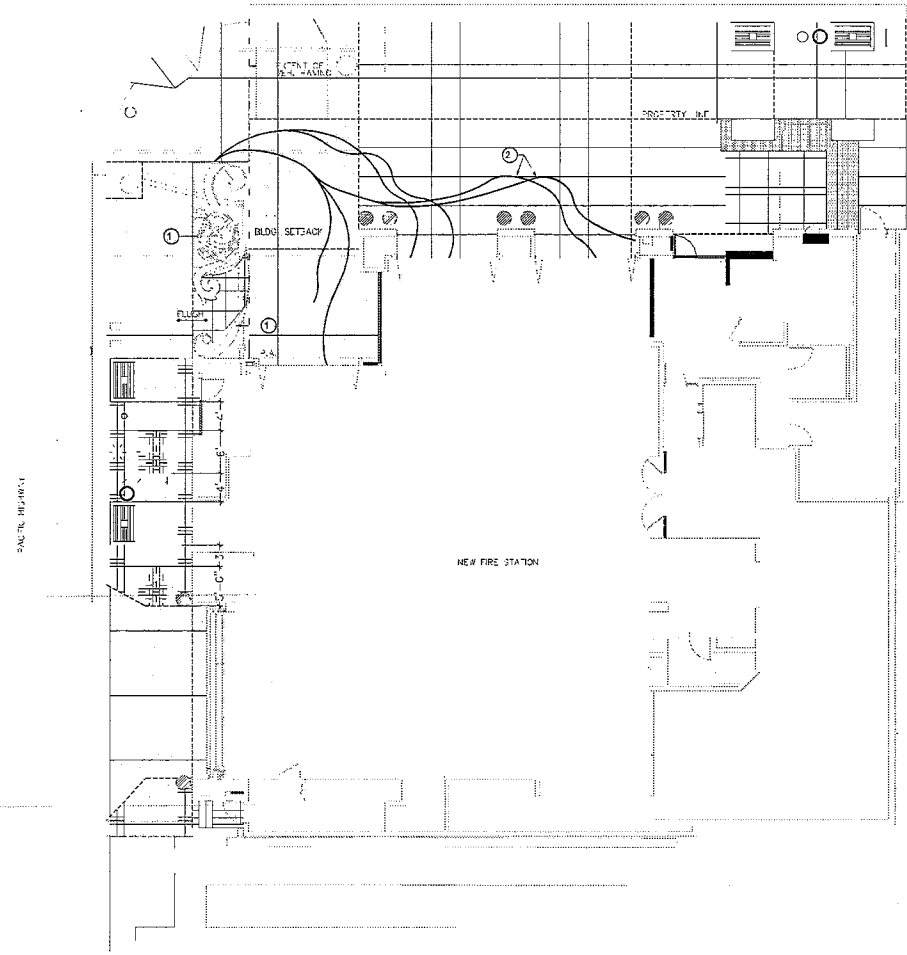
All lighting and sound equipment to be placed in room B-002.

All concrete color to match building color.

Conservator recommends that butcher's wax be applied to all metal surfaces. (see conservation report)

The artist to review all submittals and shop drawings.

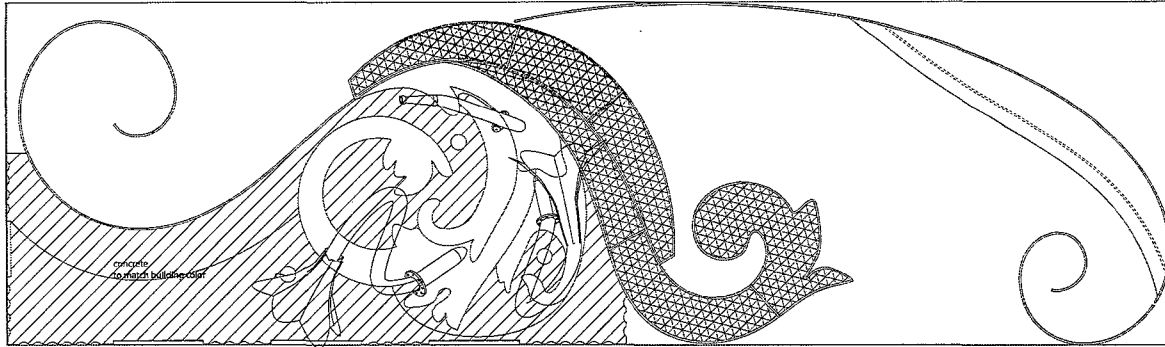
Electrical details are not included in this set.
 Electrical details including pages, E3.0 and E6.1 will be included in the building drawing set.
 Please refer to building drawing set for electrical permits.
 -E3.0 Basement floor plans showing artwork rack electrical connections in storage #B-002.
 -E6.1 Panel Schedule BL showing circuits #1 and 3 labeled 'ART WORK'
 Building Permit number # is 878795



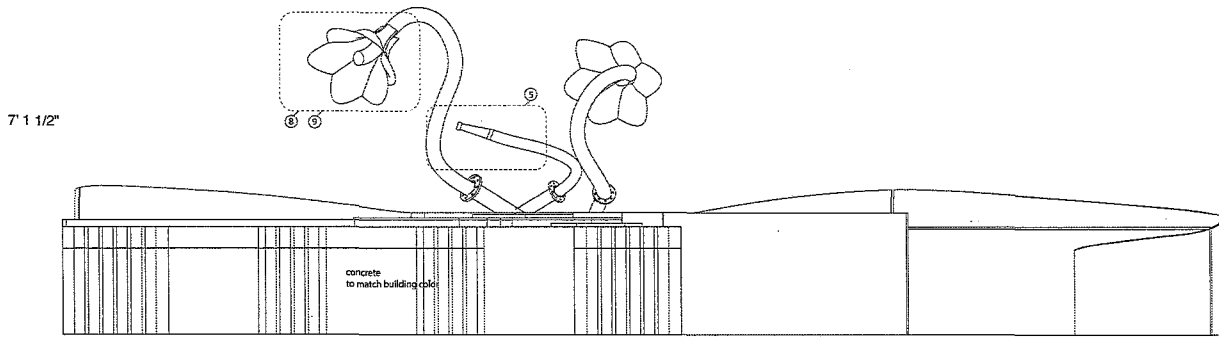
NOT FOR CONSTRUCTION OR FABRICATION

Fire Station #2 (Bayside) Artwork 1.1
 Chuck Moffit, Ingram Ober, Marisol Rendon

27' VIF



TOP VIEW
SCALE: 3/4"=1'



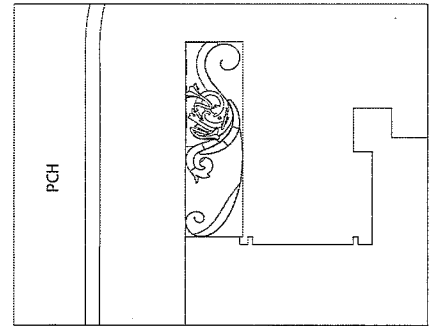
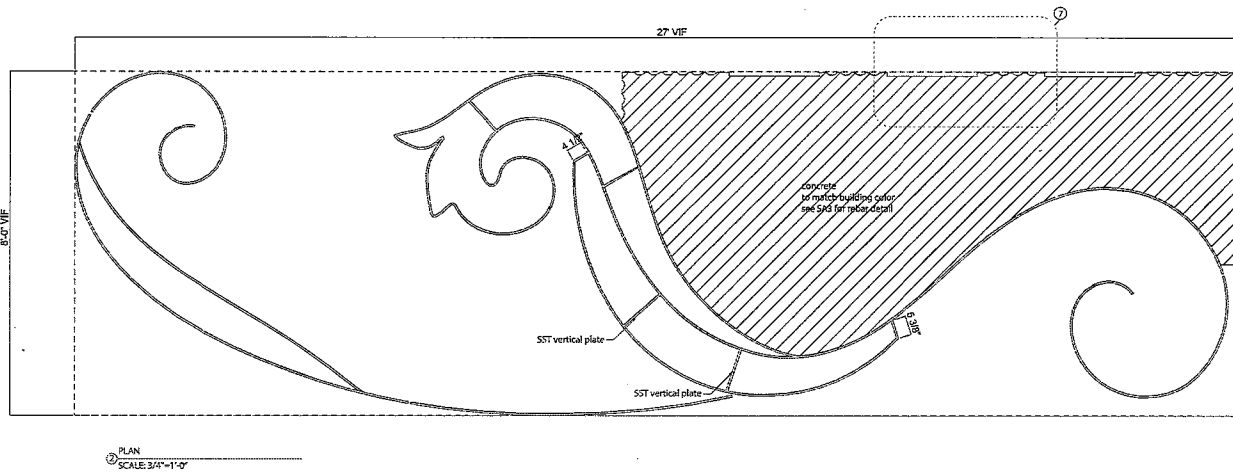
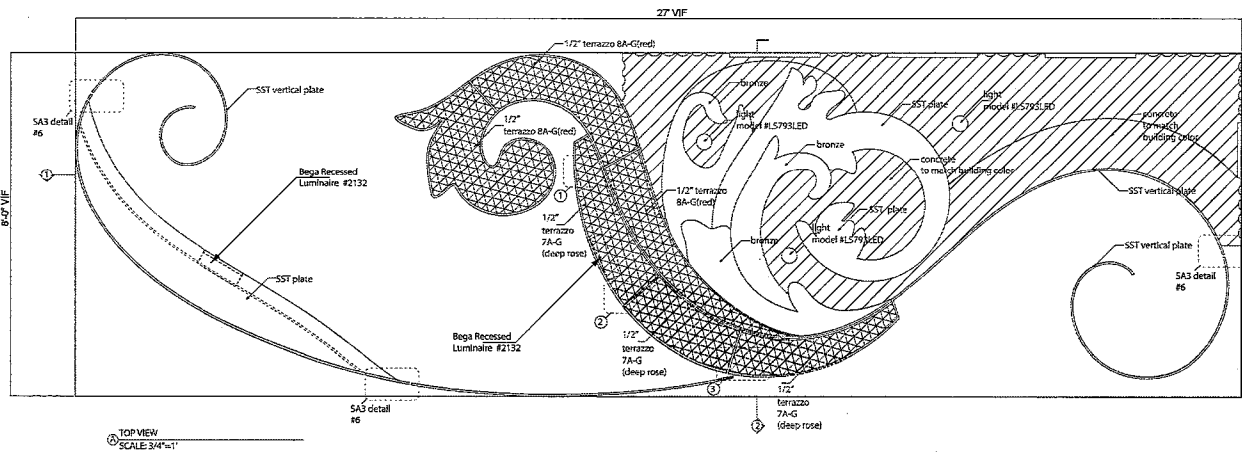
ELEVATION
SCALE: 3/4"=1'-0"

NOTES:

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- All terrazzo is Western States Terrazzo Association 7A-G(deep rose) or 8A-G(red).
- All lighting and sound equipment to be placed in room B-002.
- All concrete color to match building color.
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- The artist to review all submittals and shop drawings.
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- Building permit # is 878795

NOT FOR CONSTRUCTION OR FABRICATION

Fire Station #2 (Bayside) Artwork 1.2
Chuck Moffitt, Ingram Ober, Marisol Rendon

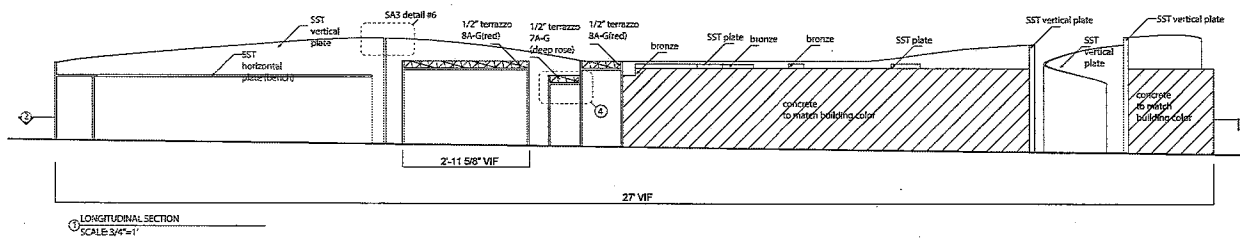


NOTES:

- All stainless steel (SST plate) to be brushed stainless steel.
- All terrazzo is Western States Terrazzo Association 7A-G(deep rose) or BA-G(red).
- All lighting and sound equipment to be placed in room B-002.
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 - E6.1 Panel Schedule BL showing circuits #1 and 3 labeled 'ART WORK'
- Building permit # is 878795

NOT FOR CONSTRUCTION OR FABRICATION

Fire Station #2 (Bayside) Artwork
Chuck Moffit, Ingram Ober, Marisol Rendon



NOTES:

All stainless steel (SST plate) to be brushed stainless steel.

All terrazzo is Western States Terrazzo Association 7A-G(deep rose) or 8A-G(red).

All lighting and sound equipment to be placed in room B-002.

All concrete color to match building color.

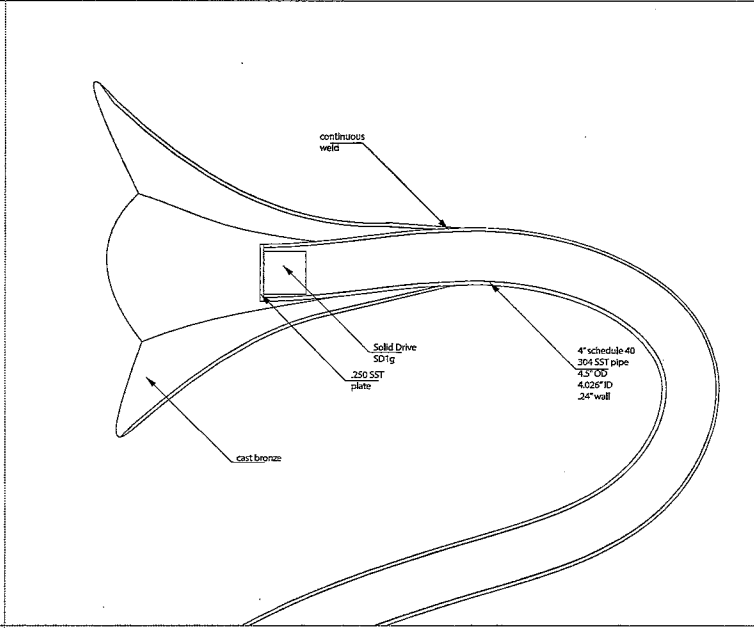
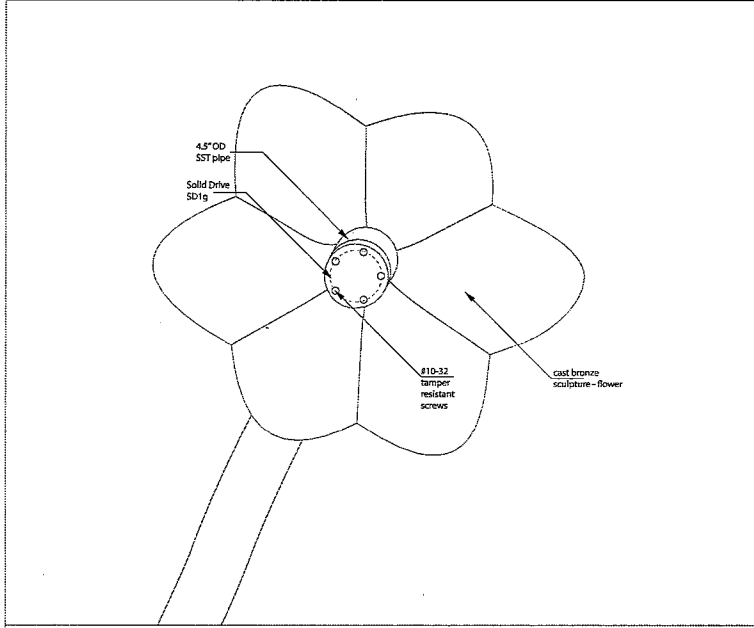
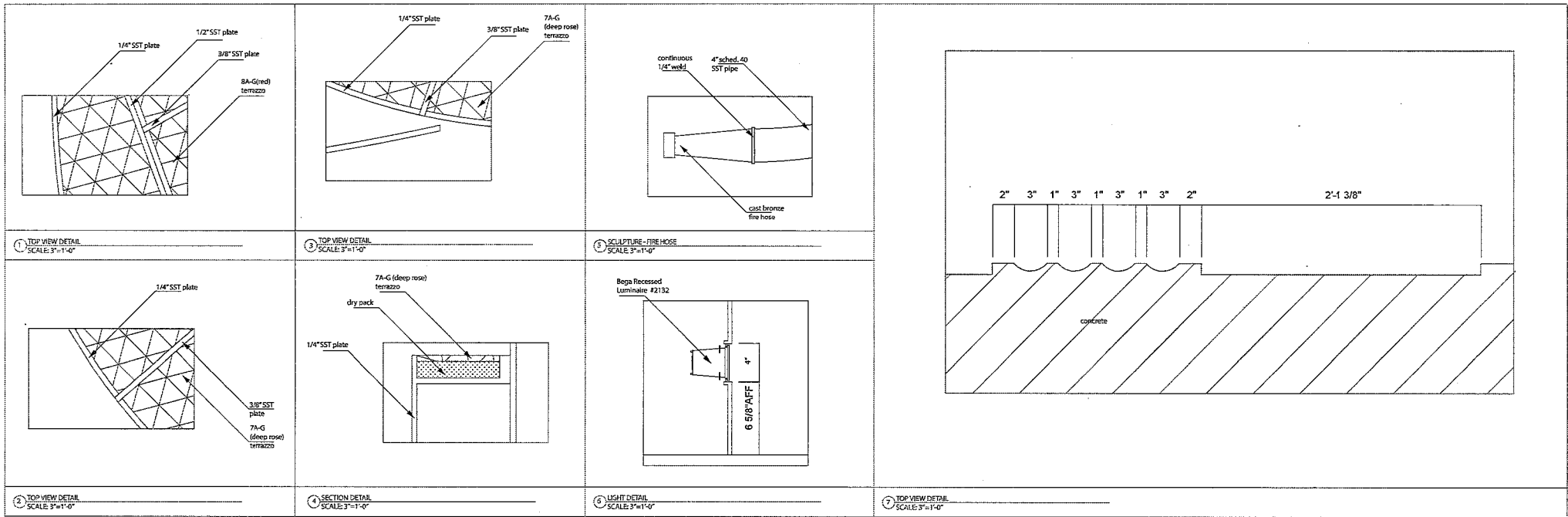
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-E3.0 Basement floor plans showing artwork rack electrical connections in storage #B-002.
-E6.1 Panel Schedule BL showing circuits #1 and 3 labeled 'ART WORK'
Building permit # is 878795

NOT FOR CONSTRUCTION OR FABRICATION

Fire Station #2 (Bayside) Artwork 1.4
Chuck Moffit, Ingram Ober, Marisol Rendon

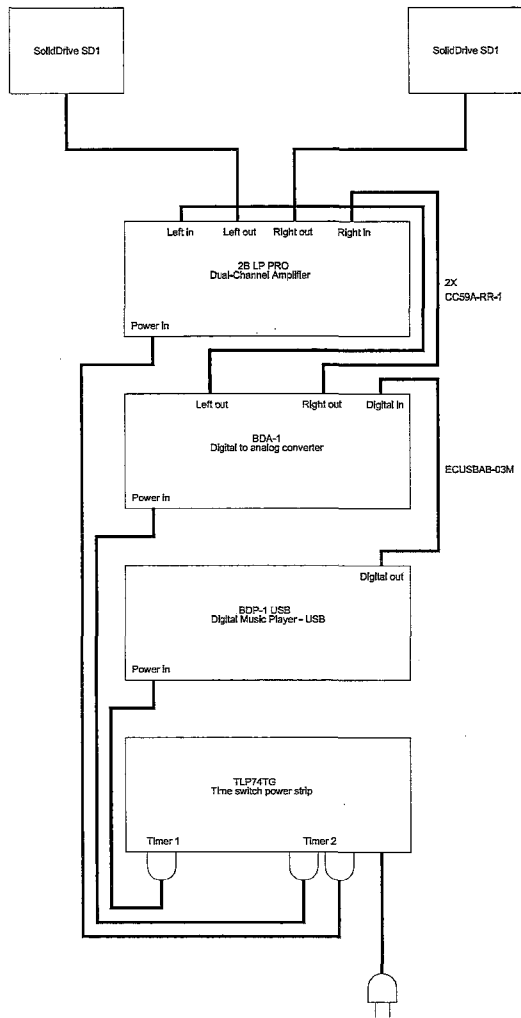


NOTES:

- All stainless steel (SST plate) to be brushed stainless steel.
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- Building permit # is 878795

NOT FOR CONSTRUCTION OR FABRICATION

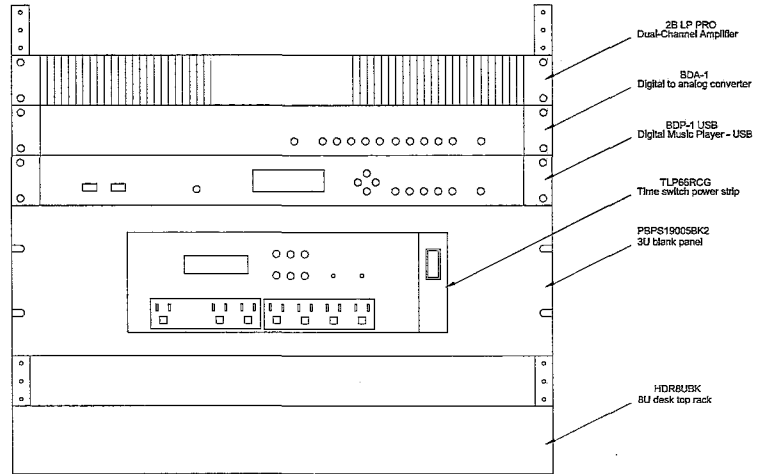
Fire Station #2 (Bayside) Artwork 1.5
Chuck Moffit, Ingram Ober, Marisol Rendon



INTERCONNECT DIAGRAM

- NOTES:
 1. ASSEMBLE RACK AND COMPONENT APPROXIMATELY AS SHOWN.
 2. WIRE ACCORDING TO INTERCONNECT DIAGRAM
 3. USE BEST COMMERCIAL PRACTICE FOR ALL CABLING AND TIE DOWNS.

FIND	QTY	PART NUMBER	DESCRIPTION	MFG
1	2	SolidDrive SD1	Sound Transducer	Sound Tube Entertainment
2	1	2B LP PRO	Dual-Channel Amplifier	Byston
3	1	BDA-1	Digital to analog converter	Byston
4	1	BDP-1 USB	Digital Music Player - USB	Byston
5	1	TLP747G	Time switch power strip	Tripp Lite
6	1	ECUSBAB-03M	USB A-B digital audio cable 1'	L-com
7	1	CC59A-RR-1	RG59 analogue audio cable 1'	L-com
8	1	PBPS19005BK2	3U blank panel	Hammond
9	1	HDR8UBK	8U desk top rack	Hammond



RACK ASSEMBLY

NOT FOR CONSTRUCTION OR FABRICATION

Electrical details are not included in this set. Electrical details including pages, E3.0 and E6.1 will be included in the building drawing set. Please refer to building drawing set or electrical permits. -E3.0 Basement floor plans showing artwork rack electrical connections in storage #B-002. -E6.1P aneS chedule BL showing circuits #1 and 3 labeled 'ART WORK' Building Permit number # is 878795

Fire Station #2 (Bayside) Artwork
 Chuck Moffit, Ingram Ober, Marisol Rendon

STRUCTURAL - GENERAL NOTES

GENERAL REQUIREMENTS
The design and construction of this project is governed by the California Building Code, and all construction shall conform to the City of San Diego, California Building Code (CBC) and the City of San Diego, California Building Code (CBC) and the City of San Diego, California Building Code (CBC).

DESIGN STANDARDS: Refer to Chapter 16 of the CBC. Where other standards are used in the design, they shall be approved by the Structural Engineer of Record.
The following specifications cover the materials of construction used in this project.

CONCRETE: The contractor shall provide the concrete documents for this project.
The contractor shall provide the concrete documents for this project.
The contractor shall provide the concrete documents for this project.

STEEL: The contractor shall provide the steel documents for this project.
The contractor shall provide the steel documents for this project.
The contractor shall provide the steel documents for this project.

WOOD: The contractor shall provide the wood documents for this project.
The contractor shall provide the wood documents for this project.
The contractor shall provide the wood documents for this project.

MASONRY: The contractor shall provide the masonry documents for this project.
The contractor shall provide the masonry documents for this project.
The contractor shall provide the masonry documents for this project.

PAINTS AND FINISHES: The contractor shall provide the paint and finish documents for this project.
The contractor shall provide the paint and finish documents for this project.
The contractor shall provide the paint and finish documents for this project.

MECHANICAL, ELECTRICAL AND PLUMBING: The contractor shall provide the mechanical, electrical and plumbing documents for this project.
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GENERAL NOTES: The contractor shall provide the general notes for this project.
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The contractor shall provide the general notes for this project.

Table with 2 columns: Item No. and Description. Includes items like 'Structural Design Chapter', 'Construction of Reinforced Concrete', and 'Steel Decking'.

Table with 2 columns: Item No. and Description. Includes items like 'Formwork', 'Reinforcement', and 'Concrete'.

Table with 2 columns: Item No. and Description. Includes items like 'Masonry', 'Blockwork', and 'Grout'.

Table with 2 columns: Item No. and Description. Includes items like 'Steel Decking', 'Steel Joists', and 'Steel Beams'.

Table with 2 columns: Item No. and Description. Includes items like 'Wood Decking', 'Wood Joists', and 'Wood Beams'.

Table with 2 columns: Item No. and Description. Includes items like 'Masonry', 'Blockwork', and 'Grout'.

Table with 2 columns: Item No. and Description. Includes items like 'Paints and Finishes', 'Mechanical', 'Electrical', and 'Plumbing'.

Table with 2 columns: Item No. and Description. Includes items like 'General Notes', 'Structural Design', and 'Construction'.

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CONCRETE REINFORCEMENT: The contractor shall provide the concrete reinforcement documents for this project.
The contractor shall provide the concrete reinforcement documents for this project.

STEEL DECKING: The contractor shall provide the steel decking documents for this project.
The contractor shall provide the steel decking documents for this project.

STEEL JOISTS: The contractor shall provide the steel joists documents for this project.
The contractor shall provide the steel joists documents for this project.

WOOD DECKING: The contractor shall provide the wood decking documents for this project.
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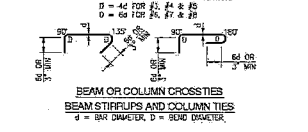
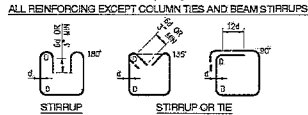
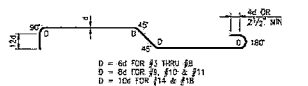
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1.7
NOT FOR CONSTRUCTION OR FABRICATION
Chuck Moffitt, Ingram Otter, Marisol Rendon



STANDARD HOOKS AND BENDS - BEAM STIRRUPS AND COLUMN TIES

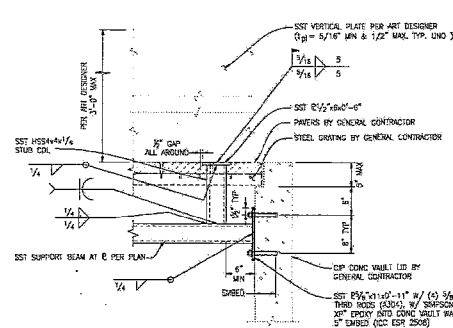
02402 (FOR REVISIONS TO STANDARD HOOKS & BENDS REF TO CURRENT AC) SCALE: NONE

BAR SIZE	MINUS		TOP BARS		HOOKED	
	Ld	Splice	Ld	Splice	Ldh	Ldb
#3	17	23	32	29	9	
#4	22	29	38	36	11	
#5	28	37	47	47	14	
#6	33	43	53	56	17	
#7	40	53	63	67	20	
#8	50	72	72	84	22	
#9	62	81	81	100	25	
#10	70	91	91	113	28	
#11	78	102	101	132	31	

- NOTES:**
- VALUES FOR UNBENTED REINFORCING AND NORMAL WEIGHT CONCRETE WITH CLEAR SPACING > 4d, CLEAR COVER = 4d AND MINIMUM STIRRUPS OR TIES THROUGHOUT. LD OR CLEAR SPACING > 2d AND CLEAR COVER > 4d.
 - DEVELOP ALL REINFORCING IN STRUCTURAL SLABS WITH MINIMUM DEVELOPMENT LENGTH Ld.
 - Ldh = DEVELOPMENT LENGTH OF BAR WITH STANDARD HOOK.
 - 2d BAR = HORIZONTAL BAR WITH MORE THAN 12" OF FRESH CONCRETE BELOW (INCLUDING WALL HORIZONTAL REINFORCING) OR AS NOTED BY OCCASIONS AS TOP BAR.
 - ALL TABULATED VALUES ARE IN INCHES.

TYPICAL LAP SPlice AND DEVELOPMENT LENGTH SCHEDULE

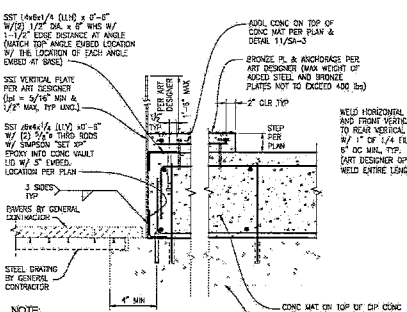
01402 SCALE: NONE



NOTE: WHERE BEAM IS SECTED IN PLAN MINIMUM ANGLE ON OTHER SIDE TO BE 30°.

PLATE ARTWORK ATTACHMENT TO SUPPORT BEAM

SCALE: 1"=1'-0"

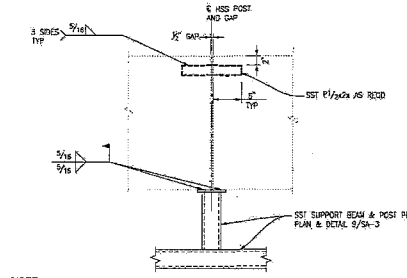


NOTE:

- ADDITIONAL INFORMATION PER 11/5A-3.
- CONTRACTOR FOR ART PIECE TO SHOW PLATE AS REQUIRED DURING THE POUR OF THE CONG MAT ON TOP OF WALLS.

SECTION

SCALE: 1"=1'-0"

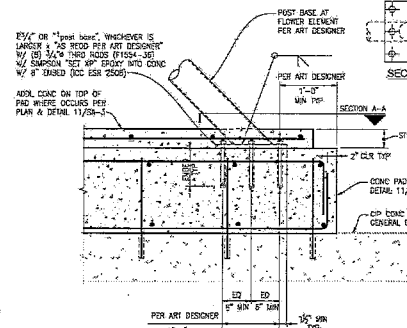


NOTE:

- ADDITIONAL INFORMATION PER 3/5A-3.
- PAVERS & CRATING NOT SHOWN FOR CLARITY.
- FOR GAP REINFORCING FOR PLATES ANCHORED TO LID REFERENCE DETAIL 7/5A-3.

GAP REINFORCEMENT AT SINGLE LINE OF PLATE

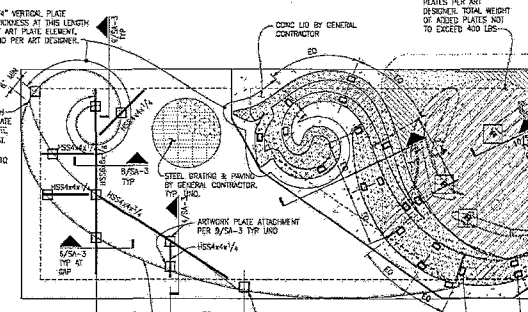
SCALE: 1"=1'-0"



NOTE: WHERE BEAM IS SECTED IN PLAN MINIMUM ANGLE ON OTHER SIDE TO BE 30°.

PLATE ARTWORK ATTACHMENT TO SUPPORT BEAM

SCALE: 1"=1'-0"

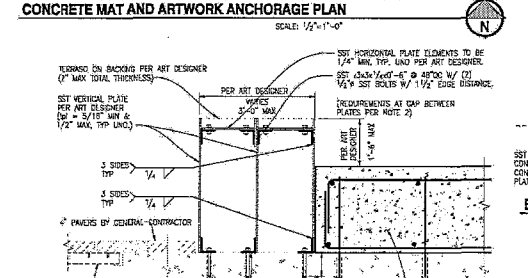


NOTE:

- WHERE ANCHOR PLATES ARE NOT DIMENSIONED, LOCATE APPROXIMATELY AS SHOWN ON PLAN.
- MAX OVERALL HEIGHT OF ANY FLOWER ELEMENT ABOVE CONCRETE MAY NOT EXCEED 5'-8", MAX HORIZONTAL DIMENSION (IN PLAN) FROM CENTER OF BASE PLATE TO THE FARTHEST END OF ELEMENT NOT TO EXCEED 5'-0".
- PROVIDE ATTACHMENT PER 8/5A-3 AT ALL GAPS BETWEEN PLATES. GAPS TO BE LOCATED BY ART DESIGNER.

CONCRETE MAT AND ARTWORK ANCHORAGE PLAN

SCALE: 1/2"=1'-0"

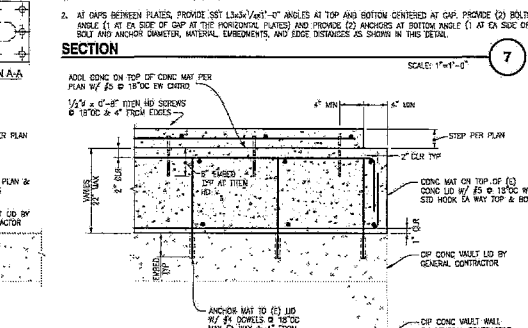


NOTE:

- ADDITIONAL INFORMATION PER 11/5A-3.
- AT GAPS BETWEEN PLATES, PROVIDE SST 1/2"x3/4"x1/2" ANCHORS AT TOP AND BOTTOM CENTERED AT GAP. PROVIDE (2) BOLTS AT TOP ANGLE (1 AT EA SIDE OF GAP AT THE HORIZONTAL PLATES) AND PROVIDE (2) ANCHORS AT BOTTOM ANGLE (1 AT EA SIDE OF GAP), BOLT AND ANCHOR DIAMETER, MATERIAL, EMBLEMINGS, AND EDGE DISTANCES AS SHOWN IN THIS DETAIL.

HSS TO HSS CONNECTION

SCALE: 1"=1'-0"

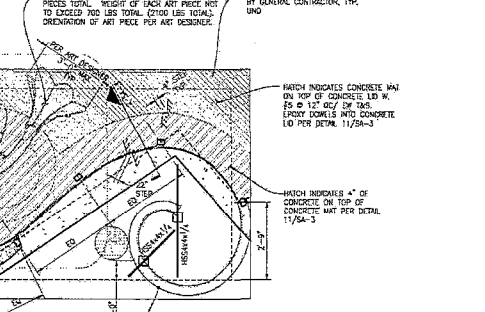


NOTE:

- ADDITIONAL INFORMATION PER 7 & 11/5A-3.

ADDITIONAL CONCRETE ON TOP OF VAULT LID

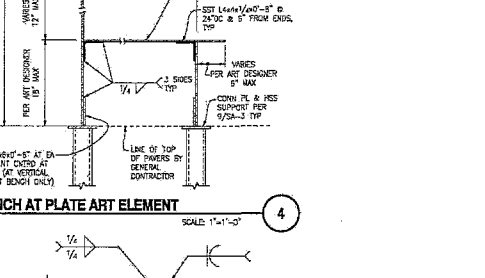
SCALE: 1"=1'-0"



NOTE: WHERE BEAM IS SECTED IN PLAN MINIMUM ANGLE ON OTHER SIDE TO BE 30°.

BENCH AT PLATE ART ELEMENT

SCALE: 1"=1'-0"

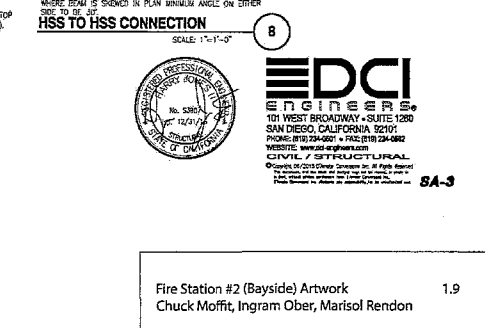


NOTE:

- ADDITIONAL INFORMATION PER 11/5A-3.
- AT GAPS BETWEEN PLATES, PROVIDE SST 1/2"x3/4"x1/2" ANCHORS AT TOP AND BOTTOM CENTERED AT GAP. PROVIDE (2) BOLTS AT TOP ANGLE (1 AT EA SIDE OF GAP AT THE HORIZONTAL PLATES) AND PROVIDE (2) ANCHORS AT BOTTOM ANGLE (1 AT EA SIDE OF GAP), BOLT AND ANCHOR DIAMETER, MATERIAL, EMBLEMINGS, AND EDGE DISTANCES AS SHOWN IN THIS DETAIL.

HSS TO HSS CONNECTION

SCALE: 1"=1'-0"



NOTE:

- ADDITIONAL INFORMATION PER 7 & 11/5A-3.

ADDITIONAL CONCRETE ON TOP OF VAULT LID

SCALE: 1"=1'-0"



Fire Station #2 (Bayside) Artwork
Chuck Moffit, Ingram Ober, Marisol Rendon

1.9

NOT FOR CONSTRUCTION OR FABRICATION

APPENDIX K

DETERMINATION OF NO HAZARD TO AIR NAVIGATION



Mail Processing Center
 Federal Aviation Administration
 Southwest Regional Office
 Obstruction Evaluation Group
 2601 Meacham Boulevard
 Fort Worth, TX 76193

Aeronautical Study No.
 2015-AWP-1062-OE
 Prior Study No.
 2010-AWP-2141-OE

Issued Date: 02/11/2015

Gretchen Sorenson
 Civic San Diego
 401 B Street, Suite 400
 San Diego, CA 92101

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure: Building Fire Station No.2
 Location: San Diego, CA
 Latitude: 32-43-18.60N NAD 83
 Longitude: 117-10-15.00W
 Heights: 13 feet site elevation (SE)
 85 feet above ground level (AGL)
 98 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

- At least 10 days prior to start of construction (7460-2, Part 1)
- Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed and maintained in accordance with FAA Advisory circular 70/7460-1 K Change 2.

This determination expires on 08/11/2016 unless:

- (a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
- (b) extended, revised, or terminated by the issuing office.
- (c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates , heights, frequency(ies) and power . Any changes in coordinates , heights, and frequencies or use of greater power will void this determination. Any future construction or alteration , including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

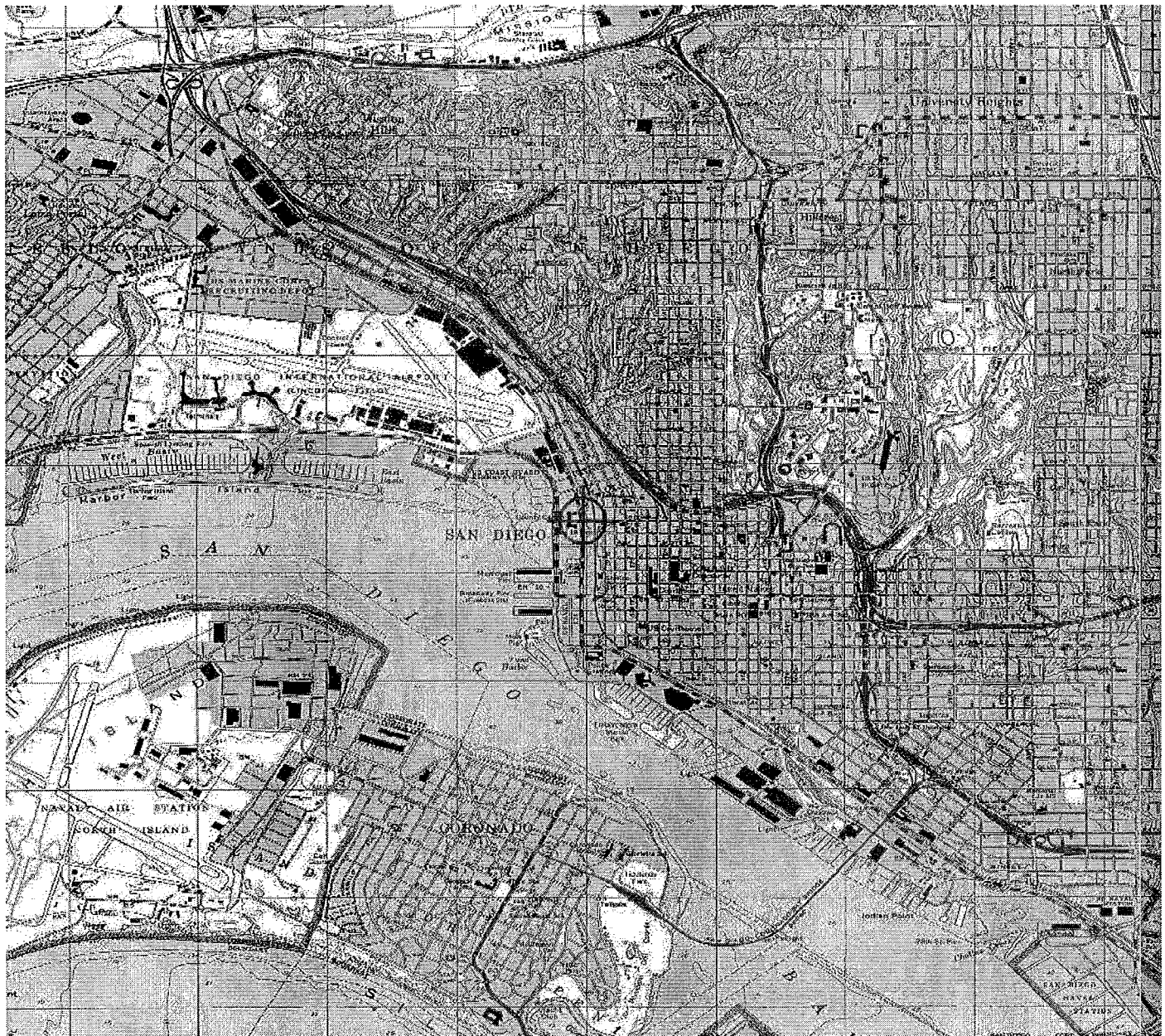
If we can be of further assistance, please contact our office at (425) 227-2625. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-AWP-1062-OE.

Signature Control No: 241616523-243102076
Paul Holmquist
Technician

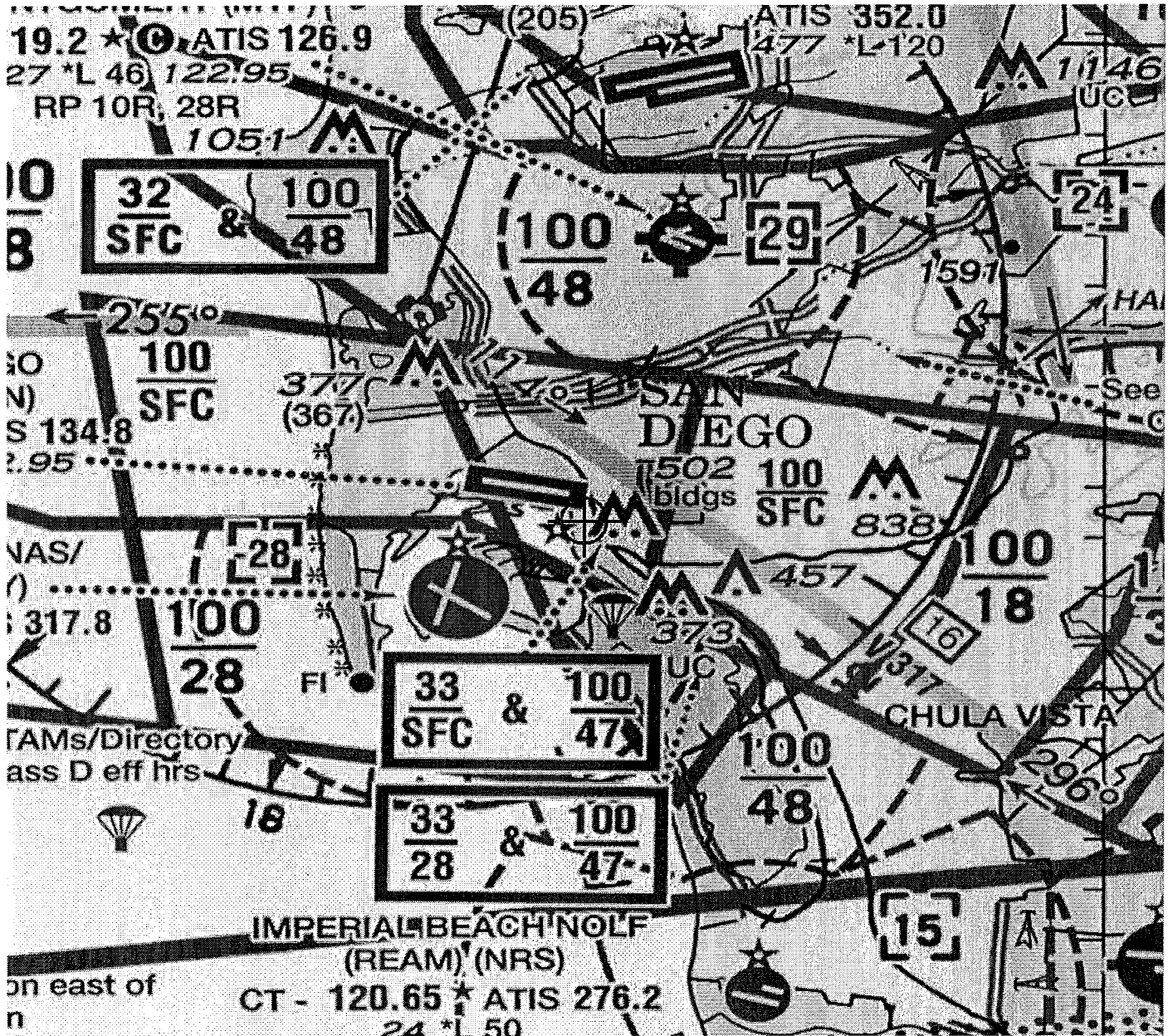
(DNE)

Attachment(s)
Map(s)

TOPO Map for ASN 2015-AWP-1062-OE



Sectional Map for ASN 2015-AWP-1062-OE



APPENDIX L

SD DOWNTOWN HOLIDAY MORATORIUM



NOTICE

DEVELOPMENT SERVICES DEPARTMENT

CITY OF SAN DIEGO - 1222 FIRST AVENUE, M.S. 501, SAN DIEGO, CALIFORNIA 92101

DATE: October 6, 2014
TO: Distribution
FROM: Nic Abboud, Senior Traffic Engineer
SUBJECT: Annual Holiday Construction Moratorium - 2014

It is once again time to remind those who do construction work on public streets within the City of San Diego about the Annual Holiday Construction Moratorium. This construction moratorium applies to the downtown area and to all other streets adjacent to major retail shopping areas of the City. The purpose of this moratorium is to minimize traffic impacts of construction on retail merchants and customers during the "holiday season".

The limits of the downtown area are described as Cedar Street on the north, 12th Avenue on the east, Harbor Drive on the south, and North Harbor Drive on the west. Please see enclosed map showing the downtown moratorium area. Also included are the streets around Fashion Valley Center, Mission Valley Center, University Town Centre, downtown La Jolla as well as other major community retail shopping areas within the City of San Diego.

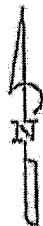
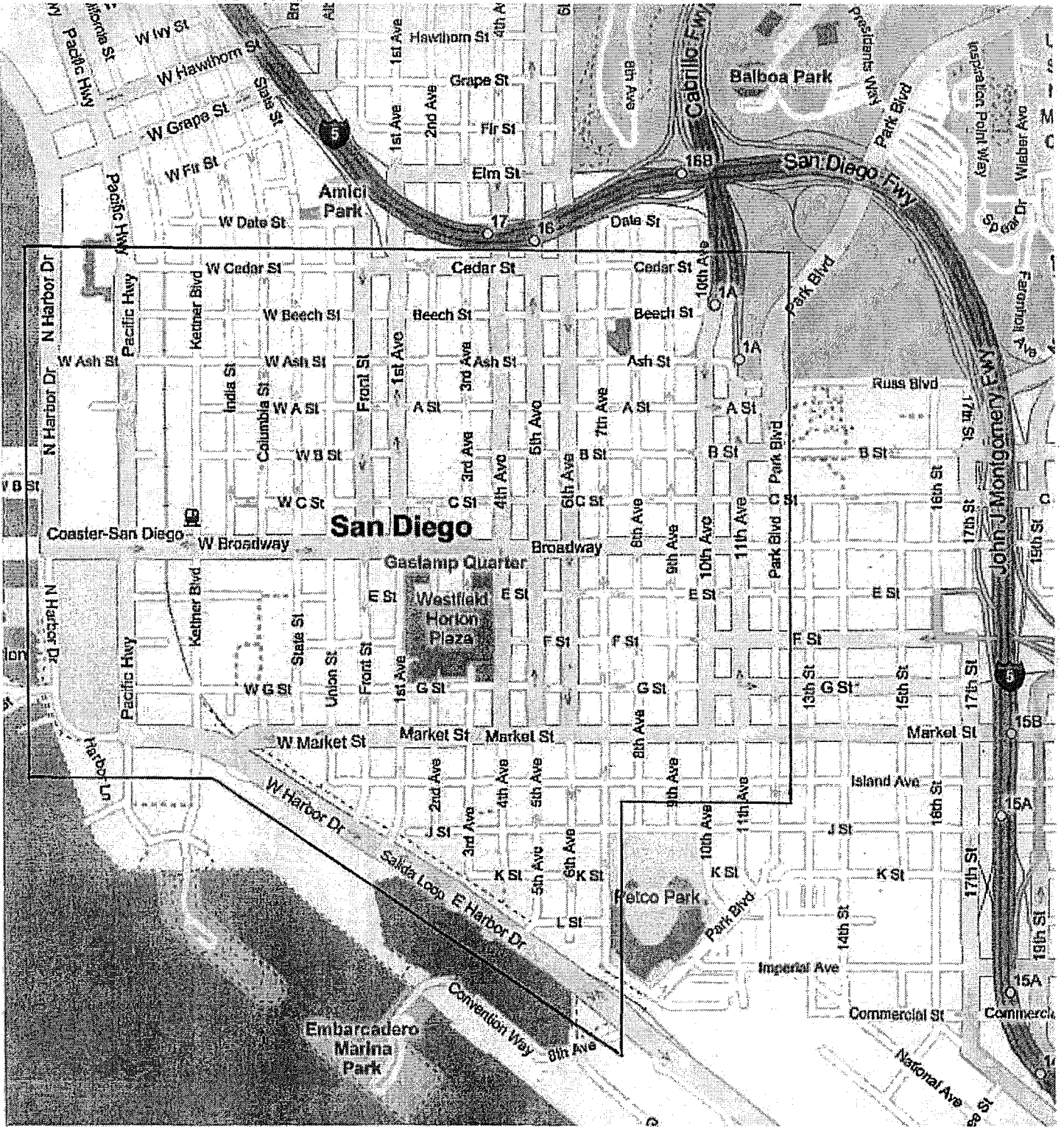
Construction activities which affect either on-street parking, vehicle travel lanes, or pedestrian sidewalk areas should be scheduled either before or after the holiday season. **The holiday season is described as starting on Thanksgiving Day and extending to New Year's Day.**

If this notification applies to others in your organization, please pass this along to them.

Your cooperation will be greatly appreciated. If you have any questions, please contact Ali Sabouri at (619) 446-5359.

Sincerely,

Nic Abboud, PhD, P.E., PTOE
Deputy City Engineer
Development Services Department



APPENDIX M
LEED COMMISSIONING PLAN

BUILDING COMMISSIONING PLAN

1.0 Overview of building system commissioning

1.01 Definition of building systems commissioning

A. Abbreviations:

- 1) AABC - Associated Air Balance Council
- 2) ACG - AABC Commissioning Guideline
- 3) ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers
- 4) BOD – Basis of Design
- 5) CD – Construction Documents
- 6) CxA – Commissioning Authority/Agent
- 7) Cx - Commissioning
- 8) FT - Functional Test
- 9) GC – General Contractor
- 10) HVAC – Heating, Ventilating & Air Conditioning
- 11) IOR – Inspector of Record
- 12) OAR – Owner’s Authorized Representative
- 13) O&M – Operations and Maintenance
- 14) OPR – Owner’s Project Requirements
- 15) PC – Pre-functional Checklist
- 16) PM – Project Manager
- 17) PV - Photovoltaic
- 18) TAB – Testing, Adjusting and Balancing
- 19) TBD – To be determined

B. Building Systems Commissioning is the process of planning, documenting, scheduling, testing, adjusting, calibrating, verifying, and training to provides a facility, which operates as a fully functional system as per the design intent.

C. Building Systems Commissioning is an administrative activity, which documents and verifies system performance in accordance with the plans, specifications and the design intent.

D. The purpose of Building Systems Commissioning is to verify and ensure that the entire building is designed, constructed and calibrated to operate as intended; and to provide the highest level of functional integrity and reliability of the subject facility.

E. Building Systems Commissioning includes:

BUILDING COMMISSIONING PLAN

- 1) Review of the design intent and basis of design documentation.
- 2) Review of the construction documents.
- 3) Review of the contractor's submittals.
- 4) Field Observation and Deficiency Reports.
- 5) Pre-functional Checklist (PC).
- 6) Verification of Functional Performance Test (FT).
- 7) Coordination with Third-Party testing agencies and Authorities Having Jurisdiction.
- 8) Participation in Owner Acceptance Testing.
- 9) Review of Operation and Maintenance Manuals (O & M).
- 10) Review of Owner Personnel Training Program.
- 11) Final Commissioning Report.

1.02 Quality Assurance

- A. Commissioning Agent: The Commissioning Agent is the designated company that implements the overall commissioning. TTG Cx is an independent company certified by the ACG with a track record of successfully commissioned educational, institutional, and commercial projects.
- B. Commissioning Agent Personnel: The following Commissioning Agent personnel will participate in the commissioning activities:
- 1) Scott Gordon is a Certified Commissioning Authority and will oversee the overall commissioning process in the on-site commissioning activities in accordance with ACG. Scott Gordon has over 23 years of diverse experience in the design, construction management and start-up and commissioning of building systems, building automation, testing and balancing of environmental systems.
 - 2) Edgar Pagdanganan is a Certified Commissioning Authority and will be the main point of contact for the project in terms of commissioning related issues.
 - 3) Max Lalangan, lead electrical systems commissioning agent.
 - 4) Mike Scharoun, lead plumbing systems commissioning agent.
- C. A complete list of Commissioning Agent personnel engaged in the commissioning process will be approved prior to commissioning activities.
- D. To earn the LEED credit for enhanced commissioning, CxA will carry out the following tasks:

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- 1) Review OPR and BOD. Generated OPR by the owner/owner's representative will be used in reviewing BOD.
- 2) Design review prior to construction document phase which should be carried out during the design development stage
- 3) Design review of construction documents which will be generated in two stages, 60%CD & 100%CD
- 4) Selective MEP equipment submittal review. This will be carried out during the early stage construction and shall cover the MEP equipment and accessories to be commissioned
- 5) Develop systems manual that is intended to provide the owner with in-depth tools and strategies for keeping the building running in optimal condition.
- 6) Post occupancy review. At the end of construction phase, the CxA will return to the building (minimum of eight months after substantial completion) to review the current operation and to identify any potential warranty related problems before expiration of warranty period.

1.03 Building System Commissioning Plan

- A. Building Systems Commissioning Plan is the commissioning management plan. It provides the basis for the commissioning process, including the responsibilities, authority and lines of communication of the commissioning team.
- B. Building Systems Commissioning Plan also describes the methodology of the major commissioning tasks.

1.04 Building Systems Commissioning Activities by Commissioning Authority Include:

- A. Planning, Scheduling, and Conducting Commissioning Meetings:
 - 1) Kick-off Commissioning Meeting within 60 days after notice to proceed.
 - 2) Monthly commissioning meetings thereafter until 30 days prior to first equipment start-up.
 - 3) Bi-weekly meetings starting 2 weeks prior to start-up and during start-up and TAB period.
 - 4) Weekly meetings during FT period.
- B. Participation in Construction Coordination Process:
 - 1) Participation in the scheduling process with the Contractor.

BUILDING COMMISSIONING PLAN

- 2) Shop drawing review.
 - 3) Contractor's equipment submittal review.
 - 4) RFI's review for impact on the commissioning process.
- C. Commissioning Field Observation and Deficiencies Reports:
- 1) Periodic field observation with increasing frequency as construction progresses.
 - 2) Documenting field observations in the Field Observation Reports.
 - 3) Maintaining running Deficiencies Log included in the Observation Reports.
 - 4) Submitting Reports to Owner's Authorized Representative (OAR) and GC within 3 days after field observation.
 - 5) At minimum, monthly field observation to be conducted until 30 days prior to first equipment start-up, and bi-weekly during start-up, and TAB period.
 - 6) During FT period, field observations will be conducted concurrent with the testing; reports will be submitted as often as it is required in order to address the deficiencies in a timely manner.
 - 7) Verification of deficiencies correction.
- D. Pre-Functional Checklist (PC):
- 1) Developing PC and forms.
 - 2) With participation of the installing contractors and GC, verification of all equipment and systems installations for submittal conformance, capacity, operability, accessibility and maintainability.
 - 3) Documenting verification on PC checklists and forms.
 - 4) Deficiencies reports.
- E. Functional Performance Tests (FT) :
- 1) Observe repeatability of 10% of all measurements – Test will be performed by the contractor in the presence of CxA and OAR and documented by CxA.
 - 2) Observe functional tests of all operation sequences – Tests performed by Controls Contractor in the presence of CxA and OAR and documented by CxA.
 - 3) Observe and document FT of all HVAC systems response to Fire, Life and Safety system test – Testing during Fire, Life and Safety acceptance test performed by installing contractors and witnessed by IOR and Authorities Having Jurisdiction.
- F. Lighting System and Controls Commissioning

BUILDING COMMISSIONING PLAN

- 1) Observe contractor's start-up.
 - 2) Verify contractor's documentation of the start-up.
 - 3) Observe and record the results of Lighting System and Controls functional testing – test performed by Electrical Contractor.
- G. Participate in Owner Acceptance Tests:
- 7) Assist in coordination and scheduling of the testing.
 - 8) Assist in testing documentation.
 - 9) Include test reports in the Final Commissioning Report.
- H. Participate in and track system troubleshooting if required.
- I. Review the O&M Manuals for each piece of equipment and system to determine appropriate information is provided.
- J. Organize, schedule and document Owner Personnel Training Program for all Building Systems.
- K. Complete Final Commissioning report which includes:
- 1) Commissioning Plan Team members responsibility and authority statements.
 - 2) Commissioning Plan Scope statements
 - 3) All design document review reports
 - 4) All submittal review reports
 - 5) All Field Observation Reports and Deficiencies Lists
 - 6) All Pre-Functional Checklists (PC).
 - 7) All Functional Performance Tests (FT).
 - 8) O & M Manual Review
 - 9) All other pertinent correspondence
- L. Perform seasonal testing of HVAC systems (if required).
- M. Perform post-occupancy testing and verification of building systems within one year of operation prior to warranty expiration.
- 1.05 Commissioning Agent will have commissioning responsibilities for the following equipment and systems on this project:
- A. Full Commissioning of Mechanical Systems and Subsystems:
- 1) Split-type A/C Units

BUILDING COMMISSIONING PLAN

- 2) Exhaust Fans
- 3) HVAC Control System
- 4) Domestic hot water system

B. Full Commissioning of Electrical Systems and Subsystems:

- 1) Lighting System and Control (Interior and Exterior)
- 2) Emergency Power Distribution System

- 1.06 Commissioning Agent will coordinate all commissioning activities with the overall project schedule.
- 1.07 Commissioning process is not a substitution for project management, construction administration, contractors' commissioning, or construction inspection.
- 1.08 The commissioning process does not relieve the subcontractors from participation in the process or diminish their role and obligations to complete all portions of work in a satisfactory and fully operational manner.
- 1.09 The contractors shall provide all technician services requiring tools or the use of tools to test, adjust or otherwise bring equipment into a fully operational state. All industry standard test equipment required for performing the tests specified shall be provided by the vendor or contractor performing the tests.

2.0 Commissioning Team, Responsibilities and Communication

2.01 Commissioning Team:

A. The Commissioning process is a team effort and its results are accomplished by the work and cooperation of the commissioning team members. The commissioning team will consists of the following members:

- 1) Commissioning Authority (CxA) – TTG Cx
- 2) Project Manger (PM) - TBD
- 3) General Contractor (GC) - TBD
- 4) Architect – Rob Wellington Quigley Architect
- 5) Mechanical & Plumbing Engineers – MA Engineers
- 6) Electrical Engineers – O'Mahony & Myer
- 7) Mechanical Contractor - TBD
- 8) Plumbing Contractor - TBD
- 9) Electrical Contractor - TBD
- 10) TAB representative - TBD

BUILDING COMMISSIONING PLAN

- 11) Controls Contractor - TBD

2.02 Commissioning Team Members Responsibilities

A. The Owner / Owner's Commissioning Coordinator:

- 1) Has sole authority to negotiate contracts, order changes to the construction contract, and make final contract related decisions such as the acceptance of equipment, systems, and operational and functional test results.
- 2) Coordinates and oversees commissioning process and all commissioning activities.
- 3) Provides commissioning direction to all commissioning team members.
- 4) Serves as the final authority for all commissioning related disputes, communications and resolutions.
- 5) Is the main communication contact for all commissioning work and activities performed by the Commissioning Team.
- 6) Provides communication between the Commissioning Agent, General Contractor, and Design Professionals.
- 7) Is the Commissioning Team's authority on the facilities operation and maintenance needs.
- 8) Provides communication and operational needs of the facilities' staff.
- 9) Reviews and approves O&M Manuals.
- 10) Reviews and approves Owner Training Program prior to its start.
- 11) Attends regularly scheduled commissioning meetings.

B. Architect:

- 1) Is the Commissioning Team's authority on the overall facilities' design intent.
- 2) Provides communication and operational assistance with commissioning issues, conflicts and design questions with the design staff.
- 3) Provides Basis of Design documentation.
- 4) Provides Lighting Control System design intent (Sequence of Operation).
- 5) Attends commissioning meetings on as-needed basis.

C. Mechanical Engineer:

- 1) Is the Commissioning Team's authority on the facilities' mechanical design.
- 2) Provides communication and operational assistance with commissioning issues, conflicts and design questions with the design

BUILDING COMMISSIONING PLAN

staff.

- 3) Attends commissioning meetings on as-needed basis.
- 4) Reviews the mechanical submittals for conformance to the design intent.

D. Electrical Engineer:

- 1) Is the Commissioning Team's authority on the facilities' electrical design and lighting system.
- 2) Provides communication and operational assistance with commissioning issues, conflicts and design questions with the design staff.
- 3) Attends commissioning meetings on as-needed basis.
- 4) Reviews the electrical submittals for conformance to the design intent.

E. General Contractor (GC):

- 1) The General Contractor is the main communication contact for all commissioning work performed by the construction team.
- 2) Provides communication between Owner's Commissioning Coordinator and all subcontractors.
- 3) Coordinate commissioning schedule and integrates commissioning activities in overall construction schedule.
- 4) Participates in commissioning field installation verification, operational performance testing, and functional performance testing.
- 5) Plans and implements Owner Training Program per contract documents requirements.
- 6) Provides video recording of the training sessions and includes the video in DVD format in Training Manuals.
- 7) Coordinates and tracks all corrective work required to complete the commissioning work.
- 8) Attends regularly scheduled commissioning meetings per section 1.04A.

F. Mechanical Contractor:

- 1) The mechanical contractor is the Commissioning Teams primary authority on the materials and methods used to implement the mechanical project scope of work.
- 2) Attends regularly scheduled commissioning meetings per section 1.04A and provides commissioning coordination for all mechanical systems commissioning activities.
- 3) Provides all required submittal information required for the design of

BUILDING COMMISSIONING PLAN

- commissioning tests by the commissioning agent.
- 4) Assists the commissioning agent in reviewing and modifying commissioning check lists for mechanical systems, for consistency with the materials and methods used in the construction of the mechanical systems.
 - 5) Provides technicians, tools, and instrumentation for mechanical commissioning activities and tests.
 - 6) Assists commissioning team in developing commissioning schedules for all mechanical commissioning activities and complete all mechanical commissioning activities to those schedules.
 - 7) Completes all corrective action, on a timely basis as required to complete all mechanical commissioning activities.
Prepare all operating and maintenance manuals and all required as-built documents in accordance with the specifications prior to owner training activities as dictated by the commissioning schedule.
 - 8) Provides owner training in accordance with the owner training agenda and schedule provided by the commissioning coordinator.
 - 9) Compile and produced completed as-built drawings, O&M manuals

G. Electrical Contractor:

- 1) The electrical contractor is the Commissioning Teams primary authority on the materials and methods used to implement the electrical project scope of work.
- 2) Attends regularly scheduled commissioning meetings per section 1.04A and provides commissioning coordination for all electrical systems commissioning activities.
- 3) Provides all required submittal information required for the design of commissioning tests by the commissioning agent.
Provides technicians, tools, and instrumentation for electrical commissioning activities and tests.
- 4) Assists commissioning team in developing commissioning schedules for all electrical commissioning activities and complete all electrical commissioning activities to those schedules.
- 5) Completes all corrective action, on a timely basis as required to complete all electrical commissioning activities.
- 6) Performs Lighting System and Controls functional performance testing witnessed by commissioning agent.
- 7) Compile and produced completed as-built drawings, O&M manuals

H. Controls Contractor:

- 1) The controls contractor is the Commissioning Teams primary authority

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- on the materials and methods used to implement the controls project scope of work.
 - 2) Attends regularly scheduled commissioning meetings per section 1.04.A and provides commissioning coordination for all controls systems commissioning activities.
 - 3) Provides all required submittal information required for the design of commissioning tests by the commissioning agent.
 - 4) Assists the commissioning agent in reviewing and modifying commissioning check list for controls systems, for consistency with the materials and methods used in the construction of the controls systems.
 - 5) Provides technicians, tools and instrumentation for all controls commissioning activities and tests.
 - 6) Assists commissioning team in developing commissioning schedules for all controls commissioning activities and complete all controls commissioning activities to those schedules.
 - 7) Completes all corrective action, on a timely basis as required to complete all controls commissioning activities.
 - 8) Compile and produced completed as-built drawings, O&M manuals
 - 9) Prepares all operating and maintenance manuals and all required as built document in accordance with the specifications prior to owner training activities as dictated by the commissioning schedule.
 - 10) Provides owner training in accordance with the owner training agenda and schedule provided by the commissioning coordinator.
- I. TAB Contractor:
- 1) The TAB contractor is the Commissioning Teams primary authority in the materials and methods used to implement the TAB project scope of work.
 - 2) Attends commissioning meetings on as-needed basis and provides commissioning coordination for all TAB systems commissioning activities.
 - 3) Provides all required submittal information required for the design of commissioning tests by the commissioning agent.
 - 4) Provides technicians, tools, and instrumentation for TAB commissioning activities and tests.
 - 5) Assists commissioning team in developing commissioning schedule for all TAB commissioning activities and complete all TAB commissioning activities to those schedules.
 - 6) Completes all corrective action, on a timely basis as required to

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- 7) complete all TAB commissioning activities.
Prepares all TAB reports and all required as-built documents in accordance with the specifications prior to owner training activities as dictated by the commissioning schedule.

J. Commissioning Agent:

- 1) The Commissioning Agent (CxA) is the Owner's commissioning consultant and the leader of the Commissioning Team. The CxA advises the Owner on issues involving the commissioning process and its intended results.
- 2) The CxA is authorized and obligated to advise the Owner of issues involving the design, construction materials, construction methods, system start-up, testing, adjusting and balancing, and other activities that are required to maximize system performance and maintainability.
- 3) The CxA is authorized and obligated to make recommendations to the Owner regarding the acceptance, modification, rejection of materials, construction procedures, schedules, tests, reports, or other items pertaining to the systems within the commissioning scope of work.
- 4) The CxA is not authorized to change existing contract documents scheduled, costs, or scope of work for any parties contracted on the project. The CxA is not empowered to direct any contractor, subcontractor or person on the project as to required changes in the work, materials used or construction methods utilized in completing their scope of work. All directives for corrective action will come through the contract chain of command as dictated by the contract documents.
- 5) Holds commissioning kick-off meeting with commissioning team to introduce the commissioning process.
- 6) Schedules and holds commissioning meetings in accordance with section 1.04A.
- 7) Provides plan, specification and submittal review for possible conflicts, deficiencies, ability to be tested and balanced, ability to be commissioned and coordination between disciplines.
- 8) Develops all commissioning schedules and assists the GC in integrating the commissioning schedules into overall construction schedule.
- 9) Develops all commissioning forms and checklists for Pre-functional verification.
- 10) Review the contractor's procedures for operational performance tests to be performed by the contractor in the start-up of all equipment and

BUILDING COMMISSIONING PLAN

- 11) Develops Functional Performance Tests (FT) to be performed by the contractors and the CxA in the performance of the functional tests for all systems included in their scope of work.
- 12) The CxA is responsible for witnessing major operational and functional tests as part of the commissioning process.
- 13) Make recommendations to the Owner regarding the acceptance of all equipment and systems tests.
- 14) Reviews all final operation and maintenance manuals and all "As-Built" documents for use in the Owner training program.
- 15) Provides the final commissioning report to the Owner.

2.03 Commissioning Communications

A. Commissioning communication is the most important factor in providing an effective commissioning process. The channels of communication are as follows:

- 1) The primary communication points for the project are Owner's Commissioning Coordinator and General Contractor.
- 2) All commissioning communication from the CxA, GC, and A/E firms goes directly to the Owner's Commissioning Coordinator for distribution to Owner's project management team, A/E firms, and to GC for further distribution to subcontractors or vendors. Owner's Commissioning Coordinator will track and facilitate timely communication between all parties.
- 3) Owner communicates directly to the CxA, A/E firms, and GC.
- 4) All commissioning communication from the Owner to the subcontractors and vendors shall go to GC for distribution to the appropriate party.
- 5) All commissioning communication for the subcontractors and vendors shall go to GC and via GC to Owner's Commissioning Coordinator. The CxA does not have any authority to direct any of the project consultants, contractors or vendors. The Owner with the CxA's recommendations, must make all commissioning decisions. All commissioning decisions will follow the communication channels established by this commissioning plan.
- 6) Documentation of working communication may be passed directly between team members as long as copies of such documents are sent through the communication channels for proper documentation.
- 7) All commissioning activities are documented as they occur. All commissioning reports are distributed as they are generated. All

BUILDING COMMISSIONING PLAN

- commissioning documentation, test reports and demonstration reports are included in the final commissioning report.
- 8) It is each commissioning team member's responsibility to distribute the required communication to their subcontractors or vendors who are not a normal commissioning team member.

3.0 Commissioning Activities

3.01 Construction Phase Commissioning Activities

- A. The CxA is representing the Owner and reports directly to the Owner for all construction phase activities.
- B. Commissioning Meetings: All commissioning team members shall attend on-site commissioning meetings as prescribed in Part 1.04.A.
- C. Contractor's Submittals and Shop Drawings Review: The commissioning authority reviews the contractor's submittals and shop drawings to verify its consistency with the design intent, and intended system functionality, maintainability, and accessibility.
- D. Commissioning Field Observations Reports: The commissioning authority conducts periodic field observations with increasing frequency as construction progresses. Field observations are recorded in the Field Observation Reports, which are submitted to Owner's Commissioning Coordinator for distribution to the entire commissioning team. CxA maintains running up-to-date Deficiencies Log which is included in each report. Deficiencies corrections verified and documented in the log by CxA.
- E. Pre-Functional Checklist (PC): With participation of the installing contractors and GC, CxA provides construction installation verification for all equipment and systems included in the project scope. Installation is verified for submittal conformance, capacity, operability, accessibility and maintainability. Any concerns or deficiencies will be submitted through Field Observations and Deficiencies Report. Pre-Functional Checklist is an important part of the construction phase activities. The CxA shall develop all PC's required to be performed by the contractor or vendor in the start-up of all equipment and systems included in the scope of work. The CxA observes all start-up activities, as well as functional performance test, of each system and piece of equipment, as listed below.
- 1) Split-type A/C Units

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- 2) Terminal Units
- 3) Exhaust Fans
- 4) Building Automation System
- 5) Lighting System and Controls
- 6) Emergency Power Distribution System
- 7) Domestic Hot Water System

Control Point to Point Test: The operational performance tests include verification point-to-point tests of all automatic control systems and electronic building management systems, including but not limited to automated temperature and humidity control system. Prior to this test, the control contractor shall complete his installation and conduct a contractors test and calibration of each point on the system. A team consisting of the CxA, the control contractor, and Owner's representative shall verify the system point-to-point test. Each point shall be verified as to its operational status and recorded on the FT test form. If more than 10% of the first 100 points do not pass the FT test the control contractor shall re-test and calibrate the entire system prior to retesting by the commissioning team. Any problems that are discovered during FT shall be documented, repaired by the contractor and re-tested by the commissioning team. The contractor must reimburse the costs for any test expense required beyond one retest per system.

- F. Test & Balance Verification: Upon completion of test and balancing work carried out by the TAB contractor, the CxA and Owner's representative shall select up to 10% of the balance readings for repeatability test by the TAB contractor. Verification readings and TAB report data shall be within $\pm 10\%$ accuracy. If more than 30% of all verified readings do not repeat, the TAB contractor shall re-balance the system before re-verification of the TAB work. Repeatability test is performed by the TAB contractor and witnessed by the CxA and Owner's representative. The TAB contractor should mark all damper settings, record all pressure settings, and mark all target grilles used in proportional balancing to ensure repeatability of the readings. The TAB contractor must provide current calibration certificates for all instrumentation used in the TAB work. The contractor must reimburse the costs for any test expense required beyond one retest per system.

- G. Functional Performance Tests (FT): The FT required to be performed by sub-contractors and GC for all the systems stated in PC. FT tests are designed to demonstrate the systems perform in accordance with the design intent. The normal method used to perform and FT is to design data trends or data logs

BUILDING COMMISSIONING PLAN

that record the operating conditions during set point changes to the system. All tests are documented on the FT forms. All tests are conducted by the contractor or vendor and are supervised by the CxA. If the FT test cannot be completed or fails and the contractor or vendor can repair the problem within a 15-minutes period, the test shall be completed. If the problem cannot be corrected within this amount of time, the test shall be documented as failed and a deficiency notice will be filed. The contractor shall correct the deficiencies and schedule a re-test for the system. The contractor must reimburse the costs for any test expense required beyond one retest per system. Functional Performance Testing should verify:

- 1) Equipment, systems and sub-systems are functioning correctly in accordance with plans and specifications.
 - 2) All interactions between equipment, systems and sub-systems are functioning correctly.
 - 3) All systems and subsystems are ready for owner occupancy and operation.
- H. Participation with Third-Party agencies and Owner's Acceptance Tests: The CxA will assist in coordination and documenting the tests performed by third-party testing agencies, Authorities Having Jurisdiction, and the Owner. Test reports will be included in the Commissioning Report.
- I. Preliminary O&M Manuals: Each contractor and vendor must submit all maintenance manuals to the General Contractor in accordance with the submittal schedule. Preliminary O&M Manuals to be submitted to Owner's Maintenance and Operations Department for review.
- J. Final O&M Manuals and As Built Drawings: Upon the completion of all FT tests, all O&M manuals and As Built Drawings shall be finalized to "As-Built" condition and shall be submitted by subcontractors to the General Contractor. The General Contractor shall review the submitted documents for completeness check prior to submission to PM. These documents shall then be reviewed by the CxA in conjunction with the A/E firms for use in the Owner Training Program.
- K. Owner Training Program: The CxA oversees Owner Training Program and verifies that it is conducted per pertinent requirements of the contract documents. General Contractor shall schedule and coordinate training seminars and sessions. Training seminars/sessions shall be presented by the design professionals, installing contractors, and equipment suppliers. Each person presenting a training session shall provide a detailed outline of the

BUILDING COMMISSIONING PLAN

training to the CxA for review prior to the training session. Each session should include any drawings, specifications, submittals, O&M manuals, as built drawings, wiring diagrams, maintenance procedures, video presentations or other multimedia productions required to properly train the owners operating personnel.

- L. Final Commissioning Report: The CxA shall provide a final commissioning report to the Owner which shall include all commissioning reports and pertinent communication, all test results, PC check sheets, and FT reports. The final report shall also include any field notes or problem areas found and their eventual solution.

3.02 Post-Construction Phase Commissioning Activities:

- A. The CxA shall review building operation with O&M staff within one year after construction completion date. The CxA shall verify building operation by randomly repeating functional performance tests within one year after construction completion date to be demonstrated by the GC and subcontractors.
- B. The CxA shall report all outstanding commissioning-related issues and system deficiencies to the Owner. The CxA shall coordinate resolution of all deficiencies and outstanding issues.

BUILDING COMMISSIONING PLAN

4.0 Proposed Commissioning Schedule

Activities	Date	Required Cx Team Members
Cx Kick-off Meeting	TBD	Design Team, PM, GC, MEP Contractors
Site Inspection	TBD	GC, MEP Contractors
Cx Mtg & Inspection	TBD	Design Team, PM, GC, MEP Contractors
Site Inspection	TBD	GC, MEP Contractors
Cx Mtg & Inspection	TBD	Design Team, PM, GC, MEP Contractors
Pre-functional Inspection	TBD	Design Team, PM, GC, MEP Contractors
Functional Testing	TBD	Design Team, PM, GC, MEP Contractors
Final Cx Report	TBD	CxA

Note: Functional testing will only be carried out once the contractors have completely tested the systems and are prepared for Cx verification process. The contractors shall submit documentation demonstrating that the systems are fully functional a week prior to scheduled Cx functional testing.

APPENDIX N

**CITY OF SAN DIEGO COUNCIL POLICY 900-11 “INCLUSION OF PUBLIC ART IN
SELECTED CAPITAL IMPROVEMENT PROGRAMS”**

CITY OF SAN DIEGO, CALIFORNIA
COUNCIL POLICY

CURRENT

SUBJECT: INCLUSION OF PUBLIC ART IN SELECTED CAPITAL
IMPROVEMENTS PROGRAM AND REDEVELOPMENT AGENCY
PROJECTS
POLICY NO.: 900-11
EFFECTIVE DATE: April 27, 2004

BACKGROUND:

The mission of the City of San Diego Commission for Arts and Culture (Commission) is to vitalize the City of San Diego (City) by integrating arts and culture into community life while supporting the region's cultural assets and showcasing San Diego as an international cultural destination. It is the Commission's responsibility to make all recommendations pertaining to arts and culture for City funding to the City Council. It is also the Commission's responsibility to advise on projects and programs designed to promote public art throughout the neighborhoods of the City, develop policies to include public art in selected Capital Improvements Program (CIP) and Redevelopment Agency projects, and to encourage the private sector to include opportunities for cultural and artistic expression in private development.

The Commission received funds from the National Endowment for the Arts (Resolution Number R-275373, adopted on March 26, 1990) and the California Arts Council (Resolution Number R-272959, adopted on February 27, 1989) to develop the Public Art Master Plan (PAMP). A city-wide pilot program was established to involve communities and artists in the development and creation of site-specific artwork. PAMP was established to better serve the City residents by providing an opportunity to build community identity and a source of pride, to enhance the existing environment of San Diego's neighborhoods, and to foster artistic expression and cultural diversity.

To further enhance the goals of the PAMP and to implement the duties of the Commission, the San Diego Municipal Code was amended (San Diego Municipal Code sections 26.0701 et seq. by ordinance O-17757 adopted on April 20, 1992). Beginning in 2002, Commission staff and consultants working on its behalf met with over 150 individuals representing the City's diverse population; held numerous focus groups; conducted a series of charettes for local artists, architects, engineers, project managers, landscape architects, and other interested citizens; and submitted many drafts of the PAMP for extensive comment and input from planning participants. The PAMP was subsequently updated and revised (Resolution Number R-299147, adopted on April 26, 2004).

The policy set forth below parallels the standard established by other municipal and state public art ordinances which mandate inclusion of artists in the design process and/or the commissioning of public art.

PURPOSE:

This policy is intended to promote the cultural heritage and artistic development of the City to enhance its character and identity, to contribute to economic development and tourism, to add warmth, dignity, beauty, and accessibility to public places and to increase opportunities for City residents to experience and participate in the visual, performing, and literary arts by directing the inclusion of public art in Capital Improvements Program projects initiated by the City and other public improvement projects undertaken by the Redevelopment Agency.

DEFINITIONS:

For purposes of this policy, the following definitions shall apply:

Artist means an individual generally recognized by critics and peers as a professional practitioner of the visual, performing, or literary arts, as judged by the quality of that professional practitioner's body of work, educational background, experience, public performances, past public commissions, exhibition record, publications, and production of artwork.

Artwork includes:

Sculpture: may be made of any material or combination of materials; may be free standing, wall-supported or suspended, kinetic, electronic or mechanical.

Murals or paintings: may be made of any material or variety of materials with or without collage; may be made with traditional or non-traditional materials and means.

Earthworks, neon, glass, organic materials (i.e., fiber, clay, wood, etc.), mosaics, photographs, prints, literary arts, calligraphy, any combination of forms of media, including audio, video, film, CD-ROM, DVD, holographic or computer generated technologies, or new genres.

Artwork may be permanent, fixed, temporary or portable, may be an integral part of a building, facility, or structure, and may be integrated with the work of other design professionals.

City Manager means the City Manager, Assistant City Manager, Deputy City Manager, or any public officer designated by the City Manager.

Eligible Construction Project means any CIP project paid for wholly by the City, or other public improvement project paid for wholly by the Redevelopment Agency, for the construction of any building, park, median, bridge, transit or aviation facility, trail, parking facility, or above-grade utility, to which the public has access or which is visible from a public right-of-way.

Eligible Project Funds means the total amount appropriated for all CIP projects or Redevelopment Agency projects in excess of \$250,000. Costs for pre-design, design, construction, and contingency are included, while costs for land acquisition, furniture, fixtures, equipment, and library books are excluded. Funds from grants, loans, bonds, enterprise funds, or other funding sources which by the terms of their applicable covenants and conditions prohibit their expenditure on artwork are not eligible.

Enterprise Funds means revenues derived from an enterprise which are placed in designated funds that are used to pay for the construction, maintenance, or operation costs of the enterprise, or for any other lawful purpose.

Extraordinary Maintenance means any non-routine repair or restoration to sound condition of public art that requires specialized professional services.

Ordinary Maintenance means any routine cleaning of public art undertaken on a regular basis.

Public Art means artwork that is created with public funds and is located in public places.

Public Art Collection means the works of public art owned by the City.

Public Art Fund means a separate fund established in the City Treasury into which all monies allocated under this policy shall be deposited.

Public Art Program includes all responsibilities and activities of the Commission under Chapter 2, Article 6, Division 7 of the San Diego Municipal Code.

Public Places means land and buildings owned by the City of San Diego.

POLICY:

It is the intent of this policy to utilize existing procedures within each sponsoring City department and the Redevelopment Agency to include public art in CIP projects and Redevelopment Agency projects. Further, this policy will be implemented and monitored without adding significant time or expense to the pertinent selection and contract procedures.

1. The City Manager shall recommend annually that the City's public art program be funded by 2% of eligible construction projects with eligible project funds in excess of \$250,000. The City Council may, in its sole discretion, allocate an amount equal to, less than, or in excess of the City Manager's recommendation to the City's public art program.
2. If the City Manager determines that anticipated revenues in the current or upcoming fiscal year will be insufficient to maintain the current level of City services, the City Manager may recommend to the City Council that compliance with this policy be temporarily suspended for the current or upcoming fiscal year. A majority vote of the City Council may temporarily suspend compliance with this policy.

3. Prior to the time that the City Council considers the annual CIP budget, the City Manager shall consult with the Redevelopment Agency, Directors or designees of the Engineering and Capital Projects Department, the Park and Recreation Department, the Metropolitan Wastewater Department, the Water Department and any other appropriate department in order to identify eligible construction projects as well as any applicable restrictions to the funds which are used to finance those projects.
4. At the time that the City Council considers the annual CIP budget, the Commission and City Manager shall submit a public art work plan to the City Council which shall propose public art projects for the next fiscal year. The work plan shall also provide the City Council with a status report on current public art projects and projects which were completed during the previous year.
5. For those eligible construction projects which have been identified in the public art work plan, the City Manager shall ensure that artists are involved in the early stages of project design so that they may become an integral part of the design process.
6. Where a CIP project is financed by an unrestricted funding source, the public art program allocation authorized by the City Council may be transferred by the City Council to the public art fund and may be used to design, fabricate, and install a work of public art at any location within the City.
7. Where a CIP project is financed in whole or in part by restricted funding sources such as enterprise funds, loans, or grants, the public art program allocation which is authorized by the City Council shall be expended only on works of public art placed at the project site. Revenues which are derived from bonds, loans, grants, or other restricted funding sources shall be segregated from other City revenues and expended in accordance with their applicable restrictions, covenants, or conditions.
8. The Redevelopment Agency shall retain eligible project funds in a separate account. Those eligible project funds may be used only for the costs of design, fabrication, and installation of a work of public art within the Redevelopment Project Area, and shall not be used to maintain works of public art within the Redevelopment Project Area.
9. The City shall be deemed the owner of any work of public art which is installed in a Redevelopment Project Area.
10. The award of all artist contracts shall be authorized by the City Council; however, artist contracts with a contract price of \$250,000 or less shall be authorized by the City Manager. The Commission, through the City Manager, shall be the contract administrator for all artist contracts awarded by the City.

CITY OF SAN DIEGO, CALIFORNIA
COUNCIL POLICY

CURRENT

11. All costs related to extraordinary maintenance of a work of public art shall be the responsibility of the Commission. All costs related to ordinary maintenance of a work of public art shall be the responsibility of the operating department for the eligible construction project. The Commission shall be responsible for the costs of all maintenance of any work of public art which is located in a Redevelopment Project Area.
12. The City Manager shall conduct a maintenance survey of the City's public art collection every five years, at a minimum. The maintenance survey shall include a condition report on each work of public art; prioritized recommendations for the restoration, repair, or maintenance of existing works of public art; and the estimated costs of those recommendations.
13. A work of public art shall not be located at or near any publicly owned facility to which the public is denied access due to security concerns or for any other reason.
14. The City Manager shall monitor the compliance with this policy.

POLICY APPLICABILITY:

This policy shall apply to all projects as described in this policy, except for:

1. A CIP project or a Redevelopment Agency project for which the City Council or the Redevelopment Agency has authorized expenditures prior to Fiscal Year 2006.
2. A CIP project which is funded by an Annual Allocation.
3. A CIP project or a Redevelopment Agency project which authorizes construction of a street, slurry sealing, or restriping.
4. A CIP project or a Redevelopment Agency project which is for affordable housing, housing for senior citizens, residential care facilities, and accessibility improvements for persons with disabilities.
5. A CIP project or a Redevelopment Agency project which is authorized as an improvement to a designated historical resource.
6. A CIP project which is limited to play areas or comfort stations.
7. A CIP project or a Redevelopment Agency project limited to the construction of underground utilities, including but not limited to water, sewer, and storm drains. Should an identified CIP project or Redevelopment Agency project provide for the construction of both underground and above ground appurtenances, then the requirements of this policy shall apply only to the eligible project funds for that portion of the project which will be constructed above ground.

CITY OF SAN DIEGO, CALIFORNIA
COUNCIL POLICY

CURRENT

8. A CIP project, a Redevelopment Agency project, or City agreement of any kind involving a reimbursement of funds, or participation in funding for the construction of a public improvement.
9. A CIP project or a Redevelopment Agency project for a maintenance assessment district or any other special assessment district.

HISTORY:

“Artist(s) Involvement in

Selected Capital Improvement Projects”

Adopted by Resolution R-279659 - 03/30/1992

Amended by Resolution R-299147 - 04/27/2004

Temporarily Suspended by Resolution R-306792 - 05/16/2011,
and Suspension Automatically Sunsets at the End of Fiscal Year 2012

ATTACHMENT F
INTENTIONALLY LEFT BLANK

City of San Diego, solely in its capacity as the designated Successor Agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic, herein referred to as

Successor Agency

CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633

ADDENDUM "A"

FOR

Fire Station No. 2 (Bayside)



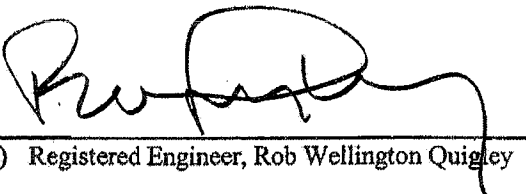
BID NO.: K-16-6523-DBB-3
SAP NO. (WBS/IO/CC): 23432314
CLIENT DEPARTMENT: 2116 / 1611 / 1912 / 2112
COUNCIL DISTRICT: 3
PROJECT TYPE: BC / IL

BID DUE DATE:

2:00 PM
OCTOBER 13, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Engineer and Architect:

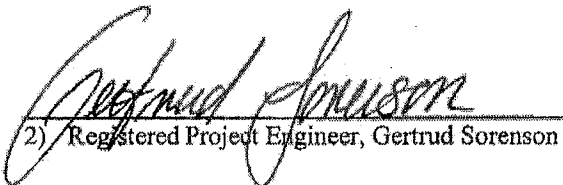

1) Registered Engineer, Rob Wellington Quigley

9/16/15
Date

Seal:



The contractual content of the engineering Specifications and Special Provisions contained herein has been reviewed by the following Professional Engineer:


2) Registered Project Engineer, Gertrud Sorenson

9/16/15
Date

Seal



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. VOLUME 1

1. To Attachment A, Scope of Work, page 30, Item 1, Scope of Work, Sub-item 1.1.1., **ADD** the following:

The drawings listed above along with the Water Pollution Control Plan (WPCP), the Water Quality Technical Report (WQTR) report, the Geotechnical and Fault Investigation, dated April 3, 2009 by Leighton and Associates and the City Engineering Signed Drawings are available for review by visiting:

<ftp://ftp.sannet.gov/OUT/ECP/2-7%20SUBSURFACE%20DATA/>

James Nagelvoort, Director
Public Works Department

Dated: *September 16, 2015*
San Diego, California

JN/JB/egz

City of San Diego, solely in its capacity as the designated Successor Agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic, herein referred to as

Successor Agency

CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633

ADDENDUM "B"

FOR



Fire Station No. 2 (Bayside)

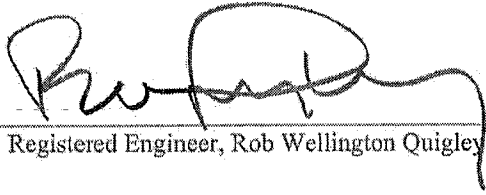
BID NO.: K-16-6523-DBB-3
SAP NO. (WBS/IO/CC): 23432314
CLIENT DEPARTMENT: 2116 / 1611 / 1912 / 2112
COUNCIL DISTRICT: 3
PROJECT TYPE: BC / IL

BID DUE DATE:

2:00 PM
OCTOBER 13, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Engineer and Architect:



1) Registered Engineer, Rob Wellington Quigley

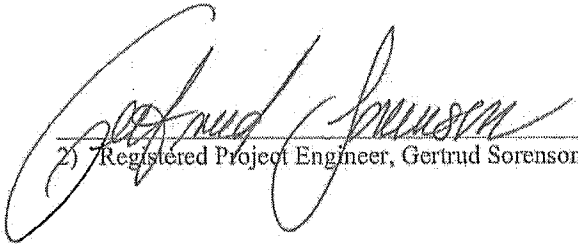
9/24/15

Date

Seal:



The contractual content of the engineering Specifications and Special Provisions contained herein has been reviewed by the following Professional Engineer:



2) Registered Project Engineer, Gertrud Sorenson

9/24/15

Date

Seal



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. CLARIFICATION

1. Architect to clarify the glazing in the 4-Fold doors:

The glazing is to be clear, tempered glazing as noted on the door and window schedules, sheets A-0.0 & A-0.1.

C. VOLUME 1

1. To Attachment E, Supplementary Special Provisions, page 58, Section 201, Concrete, Mortar, and Related Materials, Sub-section 201-1.1.2, Concrete Specified by Class, **DELETE** in its entirety and **SUBSTITUTE** with the following:

201-1.1.2 Concrete Specified by Class. To Table 201-1.1.2 (A), **ADD** the following:

<u>Item</u>	<u>Concrete Class</u>	<u>Max. Slump (in.)</u>
Concrete sidewalks	560-C-3250	4-inch (Must be certified by truck ticket.)
Concrete Curb	560-C-3250	4-inch
Concrete Street Section	560-C-3250	3-inch
Concrete driveways	4,500 psi	

All concrete driveways shall be 8" PCC minimum thickness

D. PLANS

1. To the <ftp://ftp.sannet.gov/OUT/ECP/2-7%20SUBSURFACE%20DATA/>, "P2.2, Plumbing Plan" has been **ADDED** for review.

James Nagelvoort, Director
Public Works Department

Dated: *September 24, 2015*
San Diego, California

JN/JB/egz

City of San Diego, solely in its capacity as the designated Successor Agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic, herein referred to as

Successor Agency

CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633

ADDENDUM "C"

FOR

Fire Station No. 2 (Bayside)



VOLUME 1 OF 2


BID NO.:	<u>K-16-6523-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>23432314</u>
CLIENT DEPARTMENT:	<u>2116 / 1611 / 1912 / 2112</u>
COUNCIL DISTRICT:	<u>3</u>
PROJECT TYPE:	<u>BC / IL</u>

BID DUE DATE:

**2:00 PM
OCTOBER 13, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101**

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Engineer and Architect:



1) Registered Engineer, Rob Wellington Quigley

9-30-15
Date

Seal:



The contractual content of the engineering Specifications and Special Provisions contained herein has been reviewed by the following Professional Engineer:


2) Registered Project Engineer, Gertrud Sorenson

9/30/15
Date

Seal:



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. BIDDER'S QUESTIONS

Q1. The construction duration is 400 working days; is there liquidation damage for delay on this project? If yes, what is the damage cost per day:

A1. Liquidated Damages is \$1,000 per calendar day.

Q2. The building type for this project is type III-B, fully sprinkler throughout; will the City issue Fire Sprinkler System drawings? Or is it Design Build by contractor?

A2. The Fire Sprinkler System is a Deferred Submittal, Design Build by Contractor.

Q3. Is there a finishes schedule available for this project:

A3. See sheet A-6.0

Q4. Please confirm that we can close one (1) lane along Pacific Highway in front of project site for site access and construction activities, such as, excavation, haul off spoil, set of structural steel and rooftop equipment.

A4. The construction documents include 7 stages of traffic control plans approved by the City Engineer for the various stages of work. Per section 7-10.2.2.2 of the Whitebook, the contractor shall obtain a traffic control permit for the work to be performed using the City approved traffic control plans based on the contractor's schedule of work and means and methods.

Q5. Confirm that subcontractors are not required to be prequalified with City of San Diego in order to provide a proposal to General Contractor on this project.

A5. Please reference SECTION 11 – PREQUALIFICATION OF CONTRACTORS of the Notice of Inviting Bids.

Q6. Confirm that all LEED related costs, such as, project registration, project certificate, will be cover by City Consultants.

A6. Contractor is not responsible for LEED registration and certification fees. Contractor is responsible for their cost to provide all services and documentation required for submittal of each LEED credit for which they are responsible. Contractor is responsible for submitting documentation via USGBC online to project's LEED website.

- Q7. Provide the location for Type 1-Bike Rack, Belson Outdoors.
- A7. The bike rack is located in the Storage Room, #B-002 on the Basement level. See sheet A-2.0.
- Q8. What is the thickness for glass shower doors & fixed panels?
- A8. 1/8" per the manufacturer

James Nagelvoort
Public Works Department

Dated: *October 1, 2015*
San Diego, California

JN/JB/egz

City of San Diego, solely in its capacity as the designated Successor Agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic, herein referred to as

Successor Agency

CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633

ADDENDUM "D"

FOR

Fire Station No. 2 (Bayside)



VOLUME 1 OF 2

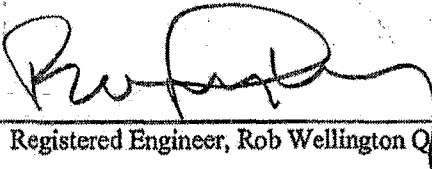
BID NO.:	<u>K-16-6523-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>23432314</u>
CLIENT DEPARTMENT:	<u>2116 / 1611 / 1912 / 2112</u>
COUNCIL DISTRICT:	<u>3</u>
PROJECT TYPE:	<u>BC / IL</u>

BID DUE DATE:

**2:00 PM
OCTOBER 13, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101**

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Engineer and Architect:

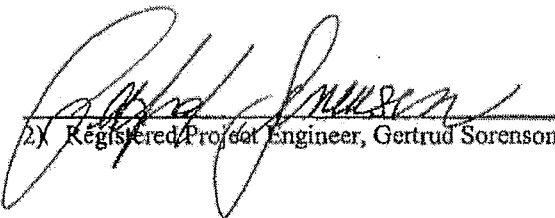

1) Registered Engineer, Rob Wellington Quigley

10-2-15
Date

Seal:



The contractual content of the engineering Specifications and Special Provisions contained herein has been reviewed by the following Professional Engineer:


2) Registered Professional Engineer, Gertrud Sorenson

10/2/15
Date

Seal



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. BIDDER'S QUESTIONS

- Q1. Will SDG&E relocate the transformer per note 7 on 36531-7-D & Site Plan E1.1? Does the City have the tentative start day for this relocation?
- A1. The transformers shown on 36531-7-D are relocated per the SDG&E design (WO 2943780) that was included in the Bid Documents. Per the SDG&E design, the entire trench, backfill, conduits, conduit intercepts, street/sidewalk break and repair is by the Contractor. SDG&E will install the new cable, connections and transformers. E1.1 does not accurately represent the work shown on the SDG&E design. All of the SDG&E work should be done per the SDG&E WO 2943780.
- Q2. Confirm that all fixture, furniture and equipment, such as, beds, mattresses, chairs and desks at dorm room will be furnished and installed by others.
- A2. See Section 2-6 (5.B.) in Volume 1 and Volume 2 Line Item#11.
- Q3. Confirm that all equipment that were listed on specification 11 31 00, residential appliances, is part of General Contractor package.
Drawing A6.4 showed dash line for most of these items.
- A3. All appliances listed are part of the general contractor package.
- Q4. Please provide specification for tackage panels as shown on 3/A6.5
- A4. See specifications section 09 65 00, #2.A.2.c.2.b, Bulletin Board.
- Q5. Who will furnish and install the fire trampoline as shown above stair no. 1 per A5.1
- A5. San Diego Fire-Rescue Department to supply, contractor to install.
- Q6. Who will furnish and install the map as shown on 3/A6.1?
- A6. San Diego Fire-Rescue Department to supply, contractor to install.
- Q7. Specification is calling out for a 75' hose reel and a remote fill outlet. You can't have both. Does dthe City want the high pressure panel mounted remote outlet, or the cabinet mounted 75' high pressure hose reel?
- A7. Use the cabinet mounted 75' high pressure hose reel.

- Q8. What is the required dimension for flume interior diameter? Is it 36" ID or 30" ID? Due to the high, we are assuming this will be closed flume in lieu of open?
The width dimension for the shaft that shown on A-3.6 are 5'-9" on W3 and 6'-3" on E3;
Will the 30" ID closed flume big enough for Firemen to slide down?
- A8. 30" ID minimum. Closed flume at the top transition to open towards the bottom. Note: the images on the drawings are diagramic. The manufacturer would not provide us with final drawings without a contract. The actual design will need to be resolved through shop drawings.
- Q.9 We are concerned about the tube extending from the central helix upward to #318. The 6' of rise to the third floor above the concrete wall offers a challenge to design and physics. We can't enlarge the embedded image in your message, but it appears that the architect may have drawn this at a 24 degree slope. This would not be steep enough descent for a dry slide, and should be elevated to a rise of 30 degrees. Feeding a tube into a spiral slide also brings issues with it. The passenger descends far enough they build velocity. They then hit the spiral or helix of the central slide and it could become a hard stop.
- A.9 See also RFI 18. We understand the velocity of the slide can be "tuned" by adjusting the steepness. Faster at the top and slower at the bottom. This will need to be worked out with the manufacturer.
- Q10. Please provide plans that show the limit of CS-1 & CS-2 on Apparatus Bay, Atrium per Finish Schedule on A-6.0
- A10. CS-1 to be the entire space as called for on the Finish Schedule, sheet A-6.0. CS-2 in the areas as noted on the Enlarged Floor Plans, sheets A-5.0 & A-5.1.
- Q11. Please provide details for planter boxes at 2nd Level per 3/L3.1; Is it fiberglass per H/L3.2? If it is, please provide manufacturer and model number.
- A11. Planters to be custom built, fiberglass per H/L3.2, size per E3/A3.6. Provide shop drawings as noted, note B, H/L3.2

James Nagelvoort
Public Works Department

Dated: *October 5, 2015*
San Diego, California

JN/JB/egz

City of San Diego, solely in its capacity as the designated Successor Agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic, herein referred to as

Successor Agency

CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633

ADDENDUM "E"

FOR

Fire Station No. 2 (Bayside)



VOLUME 1 OF 2

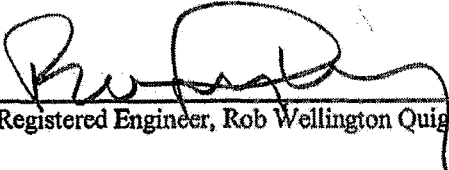
BID NO.:	<u>K-16-6523-DBB-3</u>
SAP NO. (WBS/IO/CC):	<u>23432314</u>
CLIENT DEPARTMENT:	<u>2116 / 1611 / 1912 / 2112</u>
COUNCIL DISTRICT:	<u>3</u>
PROJECT TYPE:	<u>BC / IL</u>

BID DUE DATE:

**2:00 PM
OCTOBER 13, 2015
CITY OF SAN DIEGO
PUBLIC WORKS CONTRACTS
1010 SECOND AVENUE, 14th FLOOR, MS 614C
SAN DIEGO, CA 92101**

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Engineer and Architect:

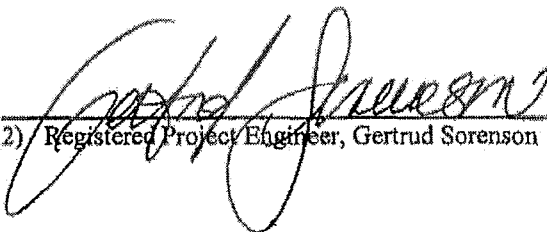

1) Registered Engineer, Rob Wellington Quigley

10/8/15
Date

Seal:



The contractual content of the engineering Specifications and Special Provisions contained herein has been reviewed by the following Professional Engineer:


2) Registered Project Engineer, Gertrud Sorenson

10/8/15
Date

Seal



A. CHANGES TO CONTRACT DOCUMENTS

The following changes to the Contract Documents are hereby made effective as though originally issued with the bid package. Bidders are reminded that all previous requirements to this solicitation remain in full force and effect.

B. BIDDER'S QUESTIONS

Q1. Provide specification for pedestal paver @ 3rd floor decks.

A1. See Specification Section 07 76 20.

Q2. Please confirm that General Contractor is responsible for the cost of testing and inspection for these trades per specification section 01 45 23:

- Concrete reinforcement 03 20 00
- Cast in place concrete 03 30 00
- Concrete Unit masonry 04 22 00
- Structural Steel framing 05 12 00
- Applied Fireproofing 07 81 00
- Glazed Aluminum curtain wall 08 44 13
- Earthwork 31 20 10

A2. Owner is responsible for cost of testing and inspection and hired LEIGHTON & ASSOCIATES, INC. to perform the services.

Q3. Provide specification for roof gravel around green roof.

A3. See note #3, sheet L1.1

Q4. Confirm that City will paid for Traffic Control Permit Fees and entire duration

A4. Contractor to pay for all Traffic Control Permit Fees. Find Vol 2, Page 10, Line # 6 for allowance fee.

Q5. Per the attached bid forms you only allowed an area for two sub listings.

Clarify if we are allowed to duplicate the subcontractor listing sheet and submit with our bid or provide us with additional forms.

A5. You can make additional copies of Form AA35 – List of Subcontractor if you run out of spaces to list your subcontractors.

- Q6. Please clarify what information is required at time of Bid and/or what the requirements are for submitting three days later.

At bid time do you want:

- a. Subcontractor Name
- b. Contractor License
- c. Type of work
- d. DIR Registration No.
- e. SLBE/ELBE

Is all other information to be turned in three days later?

- A6. The City requires all of the information you listed be filled in on from AA35 when your firm's bid is submitted. DIR Registration is required of all prime and subcontractors listed on a bid however; a subcontractor's DIR registration number is not required on form AA35.

- Q7. Can you confirm and clarify the seismic requirements for the fire alarm system?

- A7. The answer is in the specifications section 21 13 13, item 1.5 C:

C. VOLUME 1

1. To Attachment E, Supplementary Special Provisions, Technicals, **ADD "Section 07 76 20, RAISED ROOF DECK PAVING"**, page 5 of this Addendum.
2. To Attachment E, Supplementary Special Provisions, Technicals, **ADD "Section 09 96 56, EPOXY COATINGS"**, page 6 of this Addendum.

James Nagelvoort
Public Works Department

Dated: *October 9, 2015*
San Diego, California

JN/JB/egz

RAISED ROOF DECK PAVING

Section 07 76 20

1. GENERAL:

- A. SUMMARY: Provide Raised Roof Deck Paving, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM):
 - a. General: Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 3. National Roofing Contractors Association (NRCA): NRCA Waterproofing Manual and Roofing Manual.
 - 4. UL: Fire Resistance Directory and Building Material Directory.
- C. SUBMITTALS:
 - 1. General: Submit product data and shop drawings.
 - 2. Samples: If specifically requested.
 - 3. Certificates: Certify that membrane meets or exceeds specified requirements.
 - 4. Closeout: Submit maintenance data and guarantee in required form for a period of two (2) years from date of final acceptance by Owner.
- D. QUALITY ASSURANCE: Installer specializing in the work of this Section with minimum three (3) years documented experience.

2. PRODUCTS:

- A. MATERIALS:
 - 1. VOC Materials Compliance: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory; and Green Seal Standard GS-36 Adhesives for Commercial Use.
 - 2. Raised Roof Deck Paving:
 - a. General: Raised Roof Deck Paving System manufactured by Abbotsford Concrete Products, Ltd.
 - b. Alternate Manufacturers: No known equal.
 - c. Pavers: "Texada" sealed HydraPressed Slabs; size as shown, color selected by the Architect.
 - d. Pedestals: BlackJack BC Pedestal with BC-PH5 Slope Corrector.
 - 3. Waterproofing System: Refer to Section 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING.

3. EXECUTION:

- A. PREPARATION:
 - 1. Pre-Application Job-Site Conference: Scheduled by applicator with one week advance notice; to be attended by applicator, applicator's working foreman, Architect, and waterproofing material manufacturer's agent. Discuss requirements of related work surface preparation, storage and handling, protection measures, materials and application specifications.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Measurements: Take field measurements; report variance between plan and field dimensions.
 - 4. Protection: Protect work exposed to view from damage during application.
 - 5. Surface Preparation: Prepare surfaces to receive pedestals per manufacturer's instructions. Seal penetrations, small cracks and other imperfections in substrate.
- B. INSTALLATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Underlayment and Insulation: Install as shown.
 - 3. Waterproofing Membrane: Refer to Section 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING.
 - 4. Protective Counterflashing: Install as shown; refer to Section 07 60 00 - FLASHING AND SHEET METAL.
 - 5. Pedestals: Position for pattern as shown, per manufacturer's instructions.
 - 6. Pavers: Install in pattern shown; fit as required.

* * *

EPOXY COATINGS

Section 09 96 56

1. GENERAL:

- A. SUMMARY: Provide Epoxy Coatings, as shown and specified per Contract Documents.
- B. REFERENCES:
 - 1. American Society for Testing and Materials (ASTM): Materials and testing standards as identified throughout this Section or within referenced manufacturers' standard specifications.
 - 2. Steel Structures Painting Council (SSPC): Steel Structures Painting Manual.
- C. SUBMITTALS:
 - 1. General: Submit product data and a certificate stating compliance with federal, state and local VOC regulations.
 - 2. Samples: Submit manufacturer's standard colors.
 - 3. Closeout:
 - a. General: Submit maintenance data.
 - b. Guarantee:
 - 1. General: Provide in required form for a period of five (5) years from date of final acceptance by Owner.
 - 2. Criteria: Color and finish appearance shall remain unchanged throughout entire guarantee period.
- D. QUALITY ASSURANCE:
 - 1. Qualifications: Installer specializing in the work of this Section with minimum three (3) years documented experience; manufacturer approved.
 - 2. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by state and local jurisdictional regulations.

2. PRODUCTS:

- A. MATERIALS:
 - 1. LEED Certification Requirements:
 - a. VOC Materials Compliance:
 - 1. General: Use only adhesives and sealants that do not exceed the VOC limit requirements of the California Environmental Protection Agency (CalEPA), State regulations and standards; local Air Quality Management Districts (AQMD) as identified in the California Air Resources Board Local Air District Directory and the following:
 - 2. Paints and Coatings: Green Seal Standard GS-11.
 - 2. Epoxy Coating:
 - a. General: Specified products are manufactured by the Themec Co., Inc., or accepted equal.
 - b. Primer: Series 94-H₂O Hydro-Zinc.
 - c. Intermediate Coat: Series V69/V69F Hi-Build Epoxoline II.
 - d. Topcoat: Series 750 UVX (Semi-Gloss).

3. EXECUTION:

- A. PREPARATION:
 - 1. Environmental Requirements:
 - a. General: Comply with manufacturers requirements for temperature and humidity at time of application.
 - b. Ventilation: Provide adequate ventilation during application and curing.
 - 2. Examination: Examine conditions of work in place before beginning work; report defects.
 - 3. Protection: Mask, remove or cover adjacent surfaces to protect against preparation and coating application procedures.
 - 4. Surface Preparation: Prepare per manufacturer and SSPC requirements.
- B. APPLICATION:
 - 1. General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
 - 2. Performance: Apply each coat to smooth uniform finish.
- C. CLEANING:
 - 1. General: Upon completion, remove masking materials and fittings removed prior to finishing, and thoroughly clean all exposed surfaces per manufacturer's instructions.

* * *

①

DIR ✓
License ✓
MC

City of San Diego, solely in its capacity as the designated successor agency to the Redevelopment Agency of the City of San Diego, a former public body, corporate and politic, herein referred to as

Successor Agency

CONTRACTOR'S NAME: Barnhart-Reese Construction, Inc.
ADDRESS: 10805 Thornhill Rd #200 San Diego CA 92127
TELEPHONE NO.: 858-592-0500 FAX NO.: 858-592-1410
CITY CONTACT: DAMIAN SINGLETON, Contract Specialist, Email: DSingleton@sandiego.gov
Phone No. (619) 533-3482, Fax No. (619) 533-3633
G. Sorenson / J. Borja / LJI

CONTRACT DOCUMENTS



FOR

Fire Station No. 2 (Bayside)

VOLUME 2 OF 2

BID NO.: K-16-6523-DBB-3
SAP NO. (WBS/IO/CC): 23432314
CLIENT DEPARTMENT: 2116 / 1611 / 1912 / 2112
COUNCIL DISTRICT: 3
PROJECT TYPE: BC / IL

THIS CONTRACT IS SUBJECT TO THE FOLLOWING:

- THE CITY'S SUBCONTRACTING PARTICIPATION REQUIREMENTS FOR SLBE PROGRAM.
- PREVAILING WAGE RATES: STATE FEDERAL
- APPRENTICESHIP.

THIS BIDDING DOCUMENT TO BE SUBMITTED IN ITS ENTIRETY REFER TO VOLUME 1 COVER PAGE FOR TIME, DATE, AND LOCATION

TABLE OF CONTENTS

DESCRIPTION

PAGE NUMBER

Volume 2 - Bidding Documents

The following forms must be completed in their entirety and submitted with the Bid. Include the form(s) even if the information does not apply. Where the information does not apply write in N/A. Failure to include any of the forms may cause the Bid to be deemed non-responsive. If you are uncertain or have any questions about any required information, contact the City no later than 14 days prior to Bid due date.

1. Bid/Proposal..... 3
2. Bid Bond..... 6
3. Non-Collusion Affidavit to be executed by Bidder and Submitted with Bid under 23 USC 112 and PCC 7106 7
4. Contractors Certification of Pending Actions..... 8
5. Equal Benefits Ordinance Certification of Compliance..... 9
6. Proposal (Bid)..... 10
7. Form AA35 - List of Subcontractors 13
8. Form AA40 - Named Equipment/Material Supplier List 14
9. Form AA45 - Subcontractors Additive/Deductive Alternate..... 15

The Successor Agency is defined in SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS of Volume 1 of this solicitation. All references herein to City shall be deemed to refer to the Successor Agency where necessary to identify the agency in privity of contract for the performance of this project.

BIDDING DOCUMENTS

PROPOSAL

Bidder's General Information

To the City of San Diego:

Pursuant to "Notice Inviting Bids", specifications, and requirements on file with the City Clerk, and subject to all provisions of the Charter and Ordinances of the City of San Diego and applicable laws and regulations of the United States and the State of California, the undersigned hereby proposes to furnish to the City of San Diego, complete at the prices stated herein, the items or services hereinafter mentioned. The undersigned further warrants that this bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

The undersigned bidder(s) further warrants that bidder(s) has thoroughly examined and understands the entire Contract Documents (plans and specifications) and the Bidding Documents therefore, and that by submitting said Bidding Documents as its bid proposal, bidder(s) acknowledges and is bound by the entire Contract Documents, including any addenda issued thereto, as such Contract Documents incorporated by reference in the Bidding Documents.

IF A SOLE OWNER OR SOLE CONTRACTOR SIGN HERE

N/A

- (1) Name under which business is conducted _____
- (2) Signature (Given and surname) of proprietor _____
- (3) Place of Business (Street & Number) _____
- (4) City and State _____ Zip Code _____
- (5) Telephone No. _____ Facsimile No. _____
- (6) Email Address _____

IF A PARTNERSHIP, SIGN HERE:

N/A

- (1) Name under which business is conducted _____

BIDDING DOCUMENTS

(2) Name of each member of partnership, indicate character of each partner, general or special (limited):

(3) Signature (Note: Signature must be made by a general partner)

Full Name and Character of partner

(4) Place of Business (Street & Number) _____

(5) City and State _____ Zip Code _____

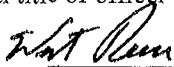
(6) Telephone No. _____ Facsimile No. _____

(7) Email Address _____

IF A CORPORATION, SIGN HERE:

(1) Name under which business is conducted Barnhart-Reese Construction, Inc.

(2) Signature, with official title of officer authorized to sign for the corporation:



(Signature)

West Reese

(Printed Name)

CEO

(Title of Officer)

(Impress Corporate Seal Here)

(3) Incorporated under the laws of the State of California

(4) Place of Business (Street & Number) 10805 Thornmint Road, Suite 200

(5) City and State San Diego, CA Zip Code 92127

(6) Telephone No. (858) 592-6500 Facsimile No. (858) 592-1410

(7) Email Address wreese@barnhartreese.com

BIDDING DOCUMENTS

THE FOLLOWING SECTIONS MUST BE FILLED IN BY ALL PROPOSERS:

In accordance with the "NOTICE INVITING BIDS", the bidder holds a California State Contractor's license for the following classification(s) to perform the work described in these specifications:

LICENSE CLASSIFICATION B, A

LICENSE NO. 912130 EXPIRES 03/31/2016

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000000044

This license classification must also be shown on the front of the bid envelope. Failure to show license classification on the bid envelope may cause return of the bid unopened.

TAX IDENTIFICATION NUMBER (TIN): [REDACTED]

Email Address: wreese@barnhartreese.com

THIS PROPOSAL MUST BE NOTARIZED BELOW:

I certify, under penalty of perjury, that the representations made herein regarding my State Contractor's license number, classification and expiration date are true and correct.

Signature *[Handwritten Signature]* Title CEO

See attached CA All Purpose Act. form

SUBSCRIBED AND SWORN TO BEFORE ME, THIS _____ DAY OF _____.

Notary Public in and for the County of _____, State of _____

(NOTARIAL SEAL)

BIDDING DOCUMENTS

BID BOND

KNOW ALL MEN BY THESE PRESENTS,

That Barnhart-Reese Construction, Inc. as Principal, and Federal Insurance Company as Surety, are held and firmly bound unto The City of San Diego hereinafter called "OWNER," in the sum of **10% OF THE TOTAL BID AMOUNT** for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has submitted a Bid to said OWNER to perform the WORK required under the bidding schedule(s) of the OWNER's Contract Documents entitled

Fire Station No. 2 (Bayside), Bid No.:K-16-6523-DBB-3

NOW THEREFORE, if said Principal is awarded a contract by said OWNER and, within the time and in the manner required in the "Notice Inviting Bids" enters into a written Agreement on the form of agreement bound with said Contract Documents, furnishes the required certificates of insurance, and furnishes the required Performance Bond and Payment Bond, then this obligation shall be null and void, otherwise it shall remain in full force and effect. In the event suit is brought upon this bond by said OWNER and OWNER prevails, said Surety shall pay all costs incurred by said OWNER in such suit, including a reasonable attorney's fee to be fixed by the court.

SIGNED AND SEALED, this 6th day of October, 20 15

Barnhart-Reese Construction, Inc. (SEAL)
(Principal)

Federal Insurance Company (SEAL)
(Surety)

By: *Walt Reese*
(Signature)

By: *Heather Saltarelli*
(Signature)
Heather Saltarelli, Attorney-in-Fact

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of SAN DIEGO)
On October 13, 2015 before me, Cathy C. Pernicano, Notary Public,
Date Here Insert Name and Title of the Officer
personally appeared West A. Reese
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature Cathy C. Pernicano
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- Corporate Officer — Title(s): _____
- Partner — Limited General
- Individual Attorney in Fact
- Trustee Guardian or Conservator
- Other: _____

Signer Is Representing: _____

Signer's Name: _____

- Corporate Officer — Title(s): _____
- Partner — Limited General
- Individual Attorney in Fact
- Trustee Guardian or Conservator
- Other: _____

Signer Is Representing: _____

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

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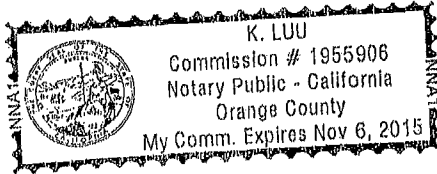
State of California)
County of Orange)

On OCT 06 2015 before me, K. Luu, Notary Public
Date Here Insert Name and Title of the Officer
personally appeared Heather Saltarelli
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature [Handwritten Signature]
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Corporate Officer -- Title(s): _____

Partner -- Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____

Signer's Name: _____

Corporate Officer -- Title(s): _____

Partner -- Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____



**Chubb
Surety**

**POWER
OF
ATTORNEY**

**Federal Insurance Company
Vigilant Insurance Company
Pacific Indemnity Company**

**Attn: Surety Department
15 Mountain View Road
Warren, NJ 07059**

Know All by These Presents, That FEDERAL INSURANCE COMPANY, an Indiana corporation, VIGILANT INSURANCE COMPANY, a New York corporation, and PACIFIC INDEMNITY COMPANY, a Wisconsin corporation, do each hereby constitute and appoint Rhonda C. Abel, Jeri Apodaca, Kim Luu, Mike Parizino, Rachelle Rheault, Heather Saltarelli and James A. Schaller of Newport Beach, California

each as their true and lawful Attorney- In- Fact to execute under such designation in their names and to affix their corporate seals to and deliver for and on their behalf as surety thereon or otherwise, bonds and undertakings and other writings obligatory in the nature thereof (other than bail bonds) given or executed in the course of business, and any instruments amending or altering the same, and consents to the modification or alteration of any instrument referred to in said bonds or obligations.

In Witness Whereof, said FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY have each executed and attested these presents and affixed their corporate seals on this 11th day of July, 2013.

Dawn M. Chloros

Dawn M. Chloros, Assistant Secretary

David B. Norris, Jr.

David B. Norris, Jr., Vice President

STATE OF NEW JERSEY

ss.

County of Somerset

On this 11th day of July, 2013 before me, a Notary Public of New Jersey, personally came Dawn M. Chloros, to me known to be Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY, the companies which executed the foregoing Power of Attorney, and the said Dawn M. Chloros, being by me duly sworn, did depose and say that she is Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY and knows the corporate seals thereof, that the seals affixed to the foregoing Power of Attorney are such corporate seals and were thereto affixed by authority of the By- Laws of said Companies; and that she signed said Power of Attorney as Assistant Secretary of said Companies by like authority; and that she is acquainted with David B. Norris, Jr., and knows him to be Vice President of said Companies; and that the signature of David B. Norris, Jr., subscribed to said Power of Attorney is in the genuine handwriting of David B. Norris, Jr., and was thereto subscribed by authority of said By- Laws and in deponent's presence.

Notarial Seal



**KATHERINE J. ADELAAR
NOTARY PUBLIC OF NEW JERSEY
No 2316685
Commission Expires July 16, 2014**

Katherine J. Adelaar

Notary Public

CERTIFICATION

Extract from the By- Laws of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY:

"All powers of attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman or the President or a Vice President or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the following officers: Chairman, President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary and the seal of the Company may be affixed by facsimile to any power of attorney or to any certificate relating thereto appointing Assistant Secretaries or Attorneys- In- Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such power of attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached."

I, Dawn M. Chloros, Assistant Secretary of FEDERAL INSURANCE COMPANY, VIGILANT INSURANCE COMPANY, and PACIFIC INDEMNITY COMPANY (the "Companies") do hereby certify that

- (i) the foregoing extract of the By- Laws of the Companies is true and correct,
- (ii) the Companies are duly licensed and authorized to transact surety business in all 50 of the United States of America and the District of Columbia and are authorized by the U.S. Treasury Department; further, Federal and Vigilant are licensed in the U.S. Virgin Islands, and Federal is licensed in American Samoa, Guam, Puerto Rico, and each of the Provinces of Canada except Prince Edward Island; and
- (iii) the foregoing Power of Attorney is true, correct and in full force and effect.

Given under my hand and seals of said Companies at Warren, NJ this

OCT 06 2015



Dawn M. Chloros

Dawn M. Chloros, Assistant Secretary

IN THE EVENT YOU WISH TO NOTIFY US OF A CLAIM, VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE CONTACT US AT ADDRESS LISTED ABOVE, OR BY Telephone (908) 903- 3493 Fax (908) 903- 3656 e-mail: surety@chubb.com

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of San Diego)
On October 13, 2015 before me, Cathy C. Pernicano, Notary Public,
Date Here Insert Name and Title of the Officer
personally appeared West A. Reese
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature Cathy C. Pernicano
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document

Title or Type of Document: _____ Document Date: _____

Number of Pages: _____ Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Corporate Officer — Title(s): _____

Partner — Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____

Signer's Name: _____

Corporate Officer — Title(s): _____

Partner — Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

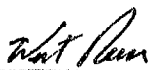
Signer Is Representing: _____

BIDDING DOCUMENTS

**NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND
SUBMITTED WITH BID UNDER 23 UNITED STATES CODE 112 AND
PUBLIC CONTRACT CODE 7106**

State of California)
) ss.
County of San Diego)

West Reese, being first duly sworn, deposes and says that he or she is CEO of the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Signed: 

Title: CEO

See attached CA All Purpose Ack. form

Subscribed and sworn to before me this _____ day of _____, 20__

Notary Public

(SEAL)

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

CIVIL CODE § 1189

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of SAN DIEGO)
On October 13, 2015 before me, Cathy C. Pernicano, Notary Public
Date Here Insert Name and Title of the Officer
personally appeared West A. Reese
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature Cathy C. Pernicano
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

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Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

Corporate Officer -- Title(s): _____

Partner -- Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____

Signer's Name: _____

Corporate Officer -- Title(s): _____

Partner -- Limited General

Individual Attorney in Fact

Trustee Guardian or Conservator

Other: _____

Signer Is Representing: _____

BIDDING DOCUMENTS

CONTRACTORS CERTIFICATION OF PENDING ACTIONS

As part of its bid or proposal (Non-Price Proposal in the case of Design-Build contracts), the Bidder shall provide to the City a list of all instances within the past 10 years where a complaint was filed or pending against the Bidder in a legal or administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers, and a description of the status or resolution of that complaint, including any remedial action taken.

CHECK ONE BOX ONLY.

- The undersigned certifies that within the past 10 years the Bidder has NOT been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers.

- The undersigned certifies that within the past 10 years the Bidder has been the subject of a complaint or pending action in a legal administrative proceeding alleging that Bidder discriminated against its employees, subcontractors, vendors or suppliers. A description of the status or resolution of that complaint, including any remedial action taken and the applicable dates is as follows:

DATE OF CLAIM	LOCATION	DESCRIPTION OF CLAIM	LITIGATION (Y/N)	STATUS	RESOLUTION/REMEDIAL ACTION TAKEN

Contractor Name: Barnhart-Reese Construction, Inc.

Certified By West Reese Title CEO

Name

West Reese

Signature

Date October 7, 2015

USE ADDITIONAL FORMS AS NECESSARY

BIDDING DOCUMENTS

**EQUAL BENEFITS ORDINANCE
CERTIFICATION OF COMPLIANCE**



For additional information, contact:
CITY OF SAN DIEGO
EQUAL BENEFITS PROGRAM
 202 C Street, MS 9A, San Diego, CA 92101
 Phone (619) 533-3948 Fax (619) 533-3220

COMPANY INFORMATION

Company Name: Barnhart-Reese Construction, Inc.	Contact Name: West Reese, CEO
Company Address: 10805 Thornmint Road, Suite 200 San Diego, CA 92127	Contact Phone: (858) 592-6500
	Contact Email: wreese@barnhartreese.com

CONTRACT INFORMATION

Contract Title: Fire Station No. 2 (Bayside)	Start Date: Dec. 2015
Contract Number (if no number, state location): K-16-6523-DBB-3	End Date: June 2017

SUMMARY OF EQUAL BENEFITS ORDINANCE REQUIREMENTS

The Equal Benefits Ordinance [EBO] requires the City to enter into contracts only with contractors who certify they will provide and maintain equal benefits as defined in SDMC §22.4302 for the duration of the contract. To comply:

- Contractor shall offer equal benefits to employees with spouses and employees with domestic partners.
 - Benefits include health, dental, vision insurance; pension/401(k) plans; bereavement, family, parental leave; discounts, child care; travel/relocation expenses; employee assistance programs; credit union membership; or any other benefit.
 - Any benefit not offer an employee with a spouse, is not required to be offered to an employee with a domestic partner.
- Contractor shall post notice of firm's equal benefits policy in the workplace and notify employees at time of hire and during open enrollment periods.
- Contractor shall allow City access to records, when requested, to confirm compliance with EBO requirements.
- Contractor shall submit *EBO Certification of Compliance*, signed under penalty of perjury, prior to award of contract.

NOTE: This summary is provided for convenience. Full text of the EBO and Rules Implementing the EBO are available at www.sandiego.gov/administration.

CONTRACTOR EQUAL BENEFITS ORDINANCE CERTIFICATION

Please indicate your firm's compliance status with the EBO. The City may request supporting documentation.



I affirm **compliance** with the EBO because my firm (*contractor must select one reason*):

- Provides equal benefits to spouses and domestic partners.
- Provides no benefits to spouses or domestic partners.
- Has no employees.
- Has collective bargaining agreement(s) in place prior to January 1, 2011, that has not been renewed or expired.

- I request the City's approval to pay affected employees a cash equivalent in lieu of equal benefits and verify my firm made a reasonable effort but is not able to provide equal benefits upon contract award. I agree to notify employees of the availability of a cash equivalent for benefits available to spouses but not domestic partners and to continue to make every reasonable effort to extend all available benefits to domestic partners.

It is unlawful for any contractor to knowingly submit any false information to the City regarding equal benefits or cash equivalent associated with the execution, award, amendment, or administration of any contract. [San Diego Municipal Code §22.4307(a)]

Under penalty of perjury under laws of the State of California, I certify the above information is true and correct. I further certify that my firm understands the requirements of the Equal Benefits Ordinance and will provide and maintain equal benefits for the duration of the contract or pay a cash equivalent if authorized by the City.

West Reese, CEO		10/7/15
Name/Title of Signatory	Signature	Date

FOR OFFICIAL CITY USE ONLY

Receipt Date: _____ EBO Analyst: _____ Approved Not Approved – Reason: _____

(Rev 02/15/2011)



THE CITY OF SAN DIEGO

Public Works
Construction Contracting
1010 Second Avenue, Suite 1400
San Diego, CA 92101
(619) 533-3450

E-MAIL TRANSMITTAL

Date: October 13, 2015

The following (1) total pages (including this cover page) are intended for:

To:	<u>Estimator</u>	From:	<u>Damian Singleton</u>
Company	<u>Barnhart Reese Construction, Inc.</u>	Division:	<u>Public Works Contracts</u>
Phone #	<u>(858) 592-6500</u>	FAX #	<u>(619) 533-3482</u>
FAX #	<u>(858) 592-1410</u>	Phone #	<u>(619) 533-3633</u>

Re: K-16-6523-DBB-3 Fire Station No.2 (Bayside)

COMMENTS: In tabulating the bid results of subject project, we have found that Line Item number 10 has been miscalculated. The Estimated Total Base Bid is \$ 337,151,247.00 not \$ 14,437,650.00 as per your bid. Please make proper corrections as soon as possible, sent it back to me and DO NOT forget to initial any corrections you have made.

If there are any problems with receiving this E-MAIL (such as missing pages), please contact the Sender at the "From" phone number given above.

THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED, AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW. RECEIPT BY AN UNINTENDED RECIPIENT DOES NOT CONSTITUTE A WAIVER OF ANY APPLICABLE PRIVILEGE.

If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited.

If you have received this communication in error, please notify us immediately by telephone, and return the original message to us at the above address via the U.S. Postal Service.

BIDDING DOCUMENTS

PROPOSAL (BID)

The Bidder agrees to the construction of **Fire Station No. 2 (Bayside)**, for the Successory Agency of San Diego, in accordance with these contract documents for the prices listed below. The Bidder guarantees the Contract Price for a period of 120 days (90 days for federally funded contracts and contracts valued at \$500,000 or less) from the date of Bid opening to Award of the Contract. The duration of the Contract Price guarantee shall be extended by the number of days required for the City to obtain all items necessary to fulfill all conditions precedent e.g., bond and insurance.

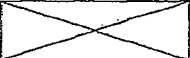
Item	Quantity	Unit	NAICS	Payment Reference	Description	Unit Price	Extension	
BASE BID								
1	1	LS	236220	9-3.4.1	Mobilization	 	\$ 4,500 ⁰⁰	
2	1	LS	541370	2-9.2	Survey Services	 	\$ 16,700 ⁰⁰	
3	1	LS	524126	2-4.1	Bonds (Payment and Performance)	 	\$ 141,489 ⁰⁰	
4	1	LS	541330	701-13.9.5	Water Pollution Control Program Development	 	\$ 13,820 ⁰⁰	
5	1	LS	237990	701-13.9.5	Water Pollution Control Program Implementation	 	\$ 15,000 ⁰⁰	
6	1	AL	236220	7-5.3	Permits Fees for City of San Diego and Railroad (California OSHA Site Specific Permit Fees and Groundwater Discharge Permit Fees and Right of Entry Permit Fees or Any Other Permit Fees) - Type II	 	\$50,000	
7	1	AL	238210	01 02 50	SDG&E Service Fee, Dry Utilities Connections, Pack Bell, AT&T and Time Warner - Type I	 	\$65,000	
8	1	LS	236220	01 02 50	Demolition/Existing Conditions at 1595 Pacific Highway, San Diego CA, 92101	 	\$ 56,420 ⁰⁰ 166,054	
9	1	LS	236220	01 02 50	Construction of Fire Station No. 2 and Related Site Improvements along Pacific Highway	 	\$ 12,136,484 ⁰⁰	
10	2550	TON	238990	703-2.12	Excavation, Segregation, Loading, Transportation, and Disposal of Non-hazardous Waste Soils containing Lead and/or Petroleum Hydrocarbons	\$ 49.6487	\$ 126,518 ⁰⁰ 126,004	
11	1	AL	236220	12900	Furniture, Fixtures and Equipment that Includes a Fire Truck - Type I	 	\$1,500,000	
12	1	AL		9-3.5	Field Orders - Type II	 	\$200,000	
ESTIMATED TOTAL BASE BID:							\$14,437,650	14,437,650

DEB
MC

MC

14,437,650 DEB

BIDDING DOCUMENTS

Item	Quantity	Unit	NAICS	Payment Reference	Description	Unit Price	Extension
ADDITIVE ALTERNATE A							
1	1	LS	237310	302-5.9	Cedar Street AC Paving Replacement		\$173,339 ^{est}
ESTIMATED TOTAL ADDITIVE ALTERNATE A:							\$173,339 ^{est}
ESTIMATED TOTAL BASE BID PLUS ADDITIVE ALTERNATE A:							\$14,610,989^{est} 14,610,989 ^{est}

MC
DEB

TOTAL BID PRICE FOR BID (Base Bid, Items 1 through 12 PLUS Additive Alternate A, Item 1, inclusive) amount written in words:

~~Fourteen million six hundred ten thousand nine hundred eighty nine and 0/100 cents~~ ^{DEB}
~~Fourteen million six hundred ten thousand nine hundred and eighty nine and 100 cents~~ ^{MC}

The Bidder is to acknowledge within the bid the receipt of any addenda that were issued. If an addendum was issued by the City and not acknowledged by the Bidder, the bid may be deemed non-responsive. The following addenda have been received and are hereby acknowledged: A, B, C, D, E.

The names of all persons interested in the foregoing proposal as principals are as follows:

- Douglas E. Barnhart, Chairman
- West Reese, CEO
- Tamela Barnhart Reese, President / Treasurer
- Nancy Jane Barnhart, Secretary

IMPORTANT NOTICE: If Bidder or other interested person is a corporation, state secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if Bidder or other interested person is an individual, state first and last names in full.

Bidder: West Reese
 Title: CEO
 Business Address: 10805 Thornmint Road, Suite 200, San Diego, CA 92127

BIDDING DOCUMENTS

Place of Business: 10805 Thornmint Road, San Diego, CA 92127

Place of Residence: 15977 Las Planideras Rancho Santa Fe, CA 92067

Signature: Walt Reem

NOTES:

- A. The low Bid will be determined by the Base Bid plus Alternate A.
- B. Once the low Bid has been determined as prescribed in Note A, the Successor Agency may, at its sole discretion, award the Contract for the Base Bid alone; or for the Base Bid plus one or more Alternates in consecutive order beginning with Alternate A.
- C. Prices and notations shall be in ink or typewritten. All corrections (which have been initiated by the Bidder using erasures, strike out, line out, or "white-out") shall be typed or written in with ink adjacent thereto, and shall be initialed in ink by the person signing the bid proposal.
- D. Failure to initial all corrections made in the bidding documents may cause the Bid to be rejected as **non-responsive** and ineligible for further consideration.
- E. Blank spaces must be filled in, using figures. Bidder's failure to submit a price for any Bid item that requires the Bidder to submit a price shall render the Bid **non-responsive** and shall be cause for its rejection.
- F. Unit prices shall be entered for all unit price items. Unit prices shall not exceed two (2) decimal places. If the Unit prices entered exceed two (2) decimal places, the Successor Agency will only use the first two digits after the decimal points without rounding up or down.
- G. All extensions of the unit prices bid will be subject to verification by the Successor Agency. In the case of inconsistency or conflict between the product of the Quantity x Unit Price and the Extension, the product shall govern.
- H. In the case of inconsistency or conflict, between the sums of the Extensions with the estimated total Bid, the sum of the Extensions shall govern.
- I. Bids shall not contain any recapitulation of the Work. Conditional Bids will be rejected as being **non-responsive**. Alternative proposals will not be considered unless called for.
- J. Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

\$ 5,121,614.00

BIDDING DOCUMENTS

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General, Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCT FOR (OR DESTINER)	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (US \$) (FILL IN)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SVA, OSBO	AWARD (GENERAL)	OFFICIAL AGENCY CONTRACT PARTNERSHIP
Name: Archibald Sheet Metal Address: 12424 Lakeshore Drive City: Lakeside State: CA Zip: 92040 Phone: 619-441-9100 Email: cyan@archibaldsheetmetal.com	constructor	896379	Sheet Metal	\$240,415.00			
Name: Address: City: State: Zip: Phone: Email:							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The DOLLAR VALUE of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as non-responsive and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WsSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder non-responsive.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT WORK TO BE PERFORMED	MIN. AMT. DOLLAR VALUE OF WORK TO BE PERFORMED BY SUBCONTRACTOR (SEE DIV. 2, SEC. 9180)	WARRANTY OF SUBCONTRACTOR	CERTIFICATION CATEGORY (SEE DIV. 2, SEC. 9180)
Name: <u>AL FIRE</u> Address: <u>8655 MIRAMAR PL</u> City: <u>SAN DIEGO</u> State: <u>CA</u> Zip: <u>92121</u> Phone: <u>858-623-2735</u> Email: <u>John@alfire.com</u>	contractor	388358	FIRE SPRINKLER	\$80,000			n/a
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____	contractor						n/a

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WsSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

BIDDING DOCUMENTS

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, or SDVOSB)	MBE, WBE, DBE, DVBE, OBE, ELBE, SDB, SB, WoSB, HUBZone, or SDVOSB	AVOID CONTRACT	CHECK FOR JOINT VENTURE PARTNERSHIP
Name: Kirk Paving Inc Address: 8722 Winter Garden Blvd City: Lakeside State: CA Zip: 92040 Phone: 619-938-9958 Email: chris.howe@cox.net	constructor	749206	Paving	\$159,750 \$179,750 \$159,750	SB micro	CADoGS	
Name: Address: City: State: Zip: Phone: Email:							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVO SB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNATOR	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (DOLLARS)	MBE WBE DBE DVBE OBE ELBE SLBE SB WoSB HUBZone OR SDVO SB	WHICH CERTIFIED	CHECKED (CERTIFIED MINORITY BUSINESS ENTERPRISE)
Name: <u>Western Garden Landscaping Inc</u> Address: <u>4616 Pannonia Rd</u> City: <u>Carlsbad</u> State: <u>CA</u> Zip: <u>92008</u> Phone: <u>760-720-1459</u> Email: <u>greg@westerngardens.net</u>	Constructor	662550	Landscape & Irrigation	\$435,668	SLBE SB (micro)	CITY CADoGS	✓
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|---------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVO SB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR'S LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MUST BE FILL IN)	MBE, MBE/DBE, DBE, DBE/SLBE, SDB, WOSE, HUBZone, OR SDVOSB	CERTIFIED (CERTIFIED)	CERTIFY TO: VENTURE PARTNERSHIP
Name: <u>UNDERGROUND PIPELINE SOLUTIONS</u> Address: <u>PO BOX 145</u> City: <u>ALPINE</u> State: <u>CA</u> Zip: <u>91903</u> Phone: <u>619 964 2276</u> Email: <u>MARTY COX 101 @ yahoo.com</u>	contractor	956807	SITE UTILITIES	\$294,551	ELBE/SLBE	CITY	n/a
Name: <u>PIPE CONSTRUCTORS INC</u> Address: <u>1680 ILLINOIS ST</u> City: <u>PERDIS</u> State: <u>CA</u> Zip: <u>92571</u> Phone: <u>951-928-2211</u> Email:	contractor	533268	FILLING SITE UTILITIES				n/a

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Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

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NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MINIMUM: \$100,000)	MBE, WBE, DBE, DVBE, OBE, SLBE, SDB, WoSB, HUBZone, GRS, SDV, OSB	WBE/COR/DFW	CHECKED BY CONTRACTOR
Name: <u>TARPY HEATING & AIR</u> Address: <u>4667 MISSION GEORGE PL</u> City: <u>SAN DIEGO</u> State: <u>CA</u> Zip: <u>92120</u> Phone: <u>619 820 4580</u> Email: <u>hbada1@tarpyheatingandair.com</u>	contractor	900580	Plumbing HEATING AIR	\$630,000			n/a
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____	contractor						n/a

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Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CADoGS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

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NAME ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MINIMUM \$10,000)	MBE WBE DBE DVBE OBE SLBE SDB WoSB HUBZone SDVOSB	WBE CERTIFIED	OTHER JOINT VENTURE PARTNERSHIP
Name: Sylvester Roofing Address: 306N West El Norte Pkwy City: Escondido State: CA Zip: 92026 Phone: 760-743-0098 Email: tony@sylvesterroofing.com	constructor	516696	Roofing	\$80,759	SB	CADoGS	
Name: Address: City: State: Zip: Phone: Email:							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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NAME ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTION OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MINIMUM \$100,000)	WBE WDB DBE DVBE OBE SLBE SDB WoSB HUBZone OR SDVOSB	WHERE PERFORMED	CHARGE POINT MEASURE PARTNERSHIP
Name: <u>STANDARD DRYWALL</u> Address: <u>9920 CHANNEL RD</u> City: <u>LAKESIDE</u> State: <u>CA</u> Zip: <u>92040</u> Phone: <u>619 443 7034</u> Email: <u>randym@standarddrywall.com</u>	contractor	444328	FRAMING (METAL STUD) DRYWALL PLASTER	\$546,577			n/a
Name: <u>BIRCH CONSTRUCTION</u> Address: <u>405 MAPLE ST</u> City: <u>RAMONA</u> State: <u>CA</u> Zip: <u>92065</u> Phone: <u>760-788-9370</u> Email:	contractor	431673	METAL STUD DRYWALL PLASTER				n/a

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
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NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MUST BE FILL IN)	MBE, WBE, DBE, DVBE, OBE, ELBE, SDB, WoSB, HUBZ or SDVOSB	OTHER CERTIFIED	OBE, CSH, JOINT VENTURE, PARTNERSHIP
Name: Southwest Door & Frame Address: 6251 Schaefer Ave City: Chino State: CA Zip: 91710 Phone: 909-465-6705 Email: andrew@sw1-ca.com	constructor	866133	Doors Frames Hardware	\$73,725			
Name: Address: City: State: Zip: Phone: Email:							

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- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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|--|--------|--|----------|
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Name: <u>Sierra Pacific West Inc.</u> Address: <u>2125 La Mirada Dr</u> City: <u>Vista</u> State: <u>CA</u> Zip: <u>92081</u> Phone: <u>760-599-0755</u> Email: <u>tbrown@sierrapacificwest.com</u>	constructor	597852	Demo, Earthwork, Abatement	\$ <u>481,937</u>	SB	CADoGS	<input checked="" type="checkbox"/>
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

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- | | | | |
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| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MINIMUM)	MBE, WBE, DBE, DVBE, OBE, SLBE, ELBE, SDVOSB, HUBZONE, OR SDVOSB	OTHER CERTIFICATIONS	OTHER CERTIFICATIONS (MINIMUM PARTICIPATION)
Name: <u>SCHLINDER ELEVATOR</u> Address: <u>PO BOX 1935</u> City: <u>MORRISTOWN</u> State: <u>NJ</u> Zip: <u>07962</u> Phone: <u>973 397 6500</u> Email: <u>mike.sahm@us.schinder.com</u>	contractor	<u>375733</u>	<u>ELEVATOR</u>	<u>\$102,663</u>			n/a
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____	contractor						n/a

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- | | | | |
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| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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|--|--------|--|----------|
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| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
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NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (W/SLBE, ELBE, OBE)	MBE, WBE, DBE, DVBE, OBE, SDB, WoSB, HUBZone, OR SDVOSB	WHEN CERTIFIED	CHECKED BY CONTRACTOR MEMBER PARANUMBER
Name: <u>RND Contractors</u> Address: <u>14796 a Jurupa Ave</u> City: <u>Fontana</u> State: <u>CA</u> Zip: <u>92337</u> Phone: <u>909-429-8500</u> Email: <u>mLerico @ rndcontractorsinc.com</u>	constructor	898471	Steel	\$722,430	SB	CADoGS	
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (IF APPLICABLE)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB	WHICH CERTIFIED	CHECKS FOR JOINT VENTURE PARTNERSHIP
Name: <u>New Dimension Masonry</u> Address: <u>1018 Cudahy Place</u> City: <u>San Diego</u> State: <u>CA</u> Zip: <u>92110</u> Phone: <u>619-276-5000</u> Email: <u>dennis@ndmin.com</u>	constructor	630794	Masonry	\$440,000			
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The **DOLLAR VALUE** of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as **non-responsive** and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder **non-responsive**.

NAME, ADDRESS AND PHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNIC	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MINIMUM \$100,000)	MBE, WBE, DBE, ELBE, SDB, WoSB, HUBZone, or SDVOSB	VALID CERTIFIED	CHECKED FOR JOINT VENTURE TENDERS
Name: <u>Infinity Metals</u> Address: <u>2001 Emery Ave</u> City: <u>La Habra</u> State: <u>CA</u> Zip: <u>90631</u> Phone: <u>562-697-8826</u> Email: <u>mfender@infinitymetals.com</u>	constructor	722577	Metal Deck	\$61,130	SB	CADoGS	
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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LIST OF SUBCONTRACTORS

In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act", Division 2, Part 1, Chapter 4 of the Public Contract Code, the Bidder shall list below the name and address of each Subcontractor who will perform work, labor, render services or specially fabricates and installs a portion [type] of the work or improvement, in an amount in excess of 0.5% of the Contractor's total Bid. The Bidder shall also list below the portion of the work which will be done by each subcontractor under this Contract. The Contractor shall list only one Subcontractor for each portion of the Work. The DOLLAR VALUE of the total Bid to be performed shall be stated for all subcontractors listed. Failure to comply with this requirement shall result in the Bid being rejected as non-responsive and ineligible for award. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percent of the Work to be performed with the Bidders' own forces. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deem the bidder non-responsive.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MUST BE FULFILLED)	MBE, WBE, DBE, DVBE, SDB, WoSB, HUBZone, OR SDVOSB	WHILE CURRENT	CHECK IF JOINT VENTURE PARTNERSHIP
Name: Division 8 Address: 1920 Cordell Court City: El Cajon State: CA Zip: 92020 Phone: 619-741-7552 Email: stephenic@division8inc.com	constructor	779435	Glass & Glazing	\$772,009	SB	CADOGS	
Name: Address: City: State: Zip: Phone: Email:							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

The Bidder will not receive any subcontracting participation percentages if the Bidder fails to submit the required proof of certification.

BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

Bidder shall list all Subcontractors described in the Bidder's *Base Bid* whose percentage of work will increase or decrease if alternates are selected for award. Bidder shall also list additional Subcontractors not described in the Bidder's *Base Bid* who, as a result of the alternates, will perform work or labor, or render services, or specially fabricate and install a portion [type] of work or improvements in an amount in excess of 0.5%. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deemed the bidder **non-responsive**.

ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR GRADE(S) OR	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MUST BE FILLED IN)	MBE, WBE, DBE, DVBE, SLBE, SDB, WoSB, HUBZone OR SDVOSB	WHERE CERTIFIED	CHECKED (ONLY MEMBERS PARTNERSHIP)
	Name: <u>Bighorn Construction</u> Address: <u>925 Poinsettia Ave. #A4</u> City: <u>Vista</u> State: <u>CA</u> Zip: <u>92081</u> Phone: <u>760-727-8837</u> Email: <u>grant@bighornconstructioninc.com</u>	Constructor	597806	Blds Concrete	\$1,407,424			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

Bidder shall list all Subcontractors described in the Bidder's Base Bid whose percentage of work will increase or decrease if alternates are selected for award. Bidder shall also list additional Subcontractors not described in the Bidder's Base Bid who, as a result of the alternates, will perform work or labor, or render services, or specially fabricate and install a portion [type] of work or improvements in an amount in excess of 0.5%. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deemed the bidder non-responsive.

ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	AMOUNT VALUE OF SUBCONTRACT (MUST BE FILLED IN)	WBE, DBE, DVBE, SLBE, SDB, WOSB, HUBZone, OR SDVOSB	OTHER CERTIFIED	CHECK FOR JOINT VENTURE PARTNERSHIP
	Name: <u>Burch Construction</u> Address: <u>P.O. Box 395</u> City: <u>Ramona</u> State: <u>CA</u> Zip: <u>92065</u> Phone: <u>760-788-9376</u> Email: <u>brogers@burchcon.com</u>	Constructor	431673	Acoustical Ceiling	\$85,000			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

⓪ As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

⓪ As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

Bidder shall list all Subcontractors described in the Bidder's *Base Bid* whose percentage of work will increase or decrease if alternates are selected for award. Bidder shall also list additional Subcontractors not described in the Bidder's *Base Bid* who, as a result of the alternates, will perform work or labor, or render services, or specially fabricate and install a portion [type] of work or improvements in an amount in excess of 0.5%. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deemed the bidder **non-responsive**.

ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	MONETARY VALUE OF SUBCONTRACT (MUST BE SPECIFIED)	MBE, WBE, DBE, DVBE, SLBE, SDB, WOSB, HUBZONE OR SDVOSB	AVAILABILITY CERTIFICATION	JOINT VENTURE PARTNERSHIP
	Name: <u>DND Concrete</u> Address: <u>13795 Blaisdell Pl. #202</u> City: <u>Poway</u> State: <u>CA</u> Zip: <u>92064</u> Phone: _____ Email: <u>Cameron@demcon.us</u>	Contractor	<u>595329</u>	<u>S40 Concrete</u>	<u>\$357,436</u>			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

ⓐ As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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- | | | | |
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| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

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ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	ESTIMATED VALUE OF SUBCONTRACT (MUST BE FILLABLE)	MBE/WBE/DVBE/ELBE/SLBE/SDB/WoSB/HUBZone/SDVOSB	AWARD SET-ASIDE	CHECK IF JOINT MEMBERSHIP
	Name: <u>Helfers</u> Address: <u>1268 Greenfield Dr.</u> City: <u>El Cajon</u> State: <u>CA</u> Zip: <u>92021</u> Phone: <u>619-456-9500</u> Email: <u>Sean.A@helferselectric.com</u>	Constructor	<u>873567</u>	<u>Electrical (on site)</u>	<u>890,000</u>			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

Certified Minority Business Enterprise	MBE	Certified Woman Business Enterprise	WBE
Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
Other Business Enterprise	OBE	Certified Emerging Local Business Enterprise	ELBE
Certified Small Local Business Enterprise	SLBE	Small Disadvantaged Business	SDB
Woman-Owned Small Business	WoSB	HUBZone Business	HUBZone
Service-Disabled Veteran Owned Small Business	SDVOSB		

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

City of San Diego	CITY	State of California Department of Transportation	CALTRANS
California Public Utilities Commission	CPUC	San Diego Regional Minority Supplier Diversity Council	SRMSDC
State of California's Department of General Services	CAD&GS	City of Los Angeles	LA
State of California	CA	U.S. Small Business Administration	SBA

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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

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ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	TOTAL VALUE OF SUBCONTRACT (MUST BE INDICATED)	MBE, WBE, DBE, DVBE, SLBE, SDB, WoSB, HUBZone, or SDVOSB	OTHER CERTIFIED	CHECKED (JOINT VENTURE PARTICIPATION)
	Name: <u>Inland Overhead Door Company</u> Address: <u>12401 South La Cadena Dr</u> City: <u>Colton</u> State: <u>CA</u> Zip: <u>92324</u> Phone: <u>909-783-3131</u> Email: <u>ryan@iohd.com</u>	Constructor	492369	Specialty Doors	\$265,995			✓
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
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| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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- | | | | |
|--|--------|--|----------|
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| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

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Subcontractors' License Number must be filled in. Failure to provide the information specified may deemed the bidder **non-responsive**.

ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER(S) SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	NOTES: VALUE OF SUBCONTRACT (M/S/EB/EL/ED/OD)	MBE/WBE/DBE/SLBE/ELBE/SDB/SDVOSB	WBE/CERTIFIED	CERTIFIED MINORITY OWNERSHIP
	Name: <u>PDI Coatings</u> Address: <u>13230 Evening Creek Dr Ste 205</u> City: <u>San Diego</u> State: <u>CA</u> Zip: <u>92074</u> Phone: <u>858-679-0742</u> Email: <u>Shannon.w@PDIcoatings.com</u>	Construction	470 254	Waterproofing	\$103,584			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

② As appropriate, Bidder shall indicate if Subcontractor is certified by:

- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

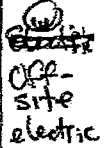
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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

Bidder shall list all Subcontractors described in the Bidder's *Base Bid* whose percentage of work will increase or decrease if alternates are selected for award. Bidder shall also list additional Subcontractors not described in the Bidder's *Base Bid* who, as a result of the alternates, will perform work or labor, or render services, or specially fabricate and install a portion [type] of work or improvements in an amount in excess of 0.5%. The Bidder shall list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors that Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

Subcontractors' License Number must be filled in. Failure to provide the information specified may deemed the bidder non-responsive.

ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	TOTAL VALUE OF CONTRACT (AMOUNT BILLED TO DATE)	TYPE OF SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, OR SDVOSB	WHERE PERFORMED	CHECKED (INITIALS) DATE
	Name: <u>Perry Electric</u> Address: <u>PO BOX 710130</u> City: <u>Santee</u> State: <u>90072CA</u> Zip: <u>90072</u> Phone: <u>619-449-0045</u> Email: <u>info@perryelectric.sd.com</u>	Constructor	747931	 OFF-site electric	\$550,294	SLBE HUBZone	City	
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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- | | | | |
|--|--------|--|----------|
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| California Public Utilities Commission | CPUC | San Diego Regional Minority Supplier Diversity Council | SRMSDC |
| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
| State of California | CA | U.S. Small Business Administration | SBA |

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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

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ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MUST BE SPECIFIED)	MBE, DBE, DVBE, OBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB	WHETHER CERTIFIED	CHECK FOR JOINT VENTURE OWNERSHIP
	Name: <u>Quality Rebar, Inc.</u> Address: <u>PO Box 501877</u> City: <u>San Diego</u> State: <u>CA</u> Zip: <u>92150</u> Phone: <u>858-748-8406</u> Email: <u>j.miller@qualityrebar.com</u>	Construction	818593	Rebar	520,894	SR Micro	CAD o GS	
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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|--|--------|--|----------|
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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

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Subcontractors' License Number must be filled in. Failure to provide the information specified may deemed the bidder non-responsive.

ADDITIVE/DEDUCTIVE ALTERNATE	NAME ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	MONETARY VALUE OF SUBCONTRACT (W/O SDB, SDB, OBE, DVBE)	MBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WOSB, HUBZONE, SDVOSB	WAGE CERTIFICATE	CERTIFICATED JOINT VENTURE PARTNERSHIP
	Name: <u>RBE</u> Address: <u>10765 Woodside Ave STE E</u> City: <u>Santee</u> State: <u>CA</u> Zip: <u>92071</u> Phone: <u>619-440-5858</u> Email: <u>Mike @ rbe painting.com</u>	Construction	591196	Paint	77,770 74,526			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

① As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
| Certified Disadvantaged Business Enterprise | DBE | Certified Disabled Veteran Business Enterprise | DVBE |
| Other Business Enterprise | OBE | Certified Emerging Local Business Enterprise | ELBE |
| Certified Small Local Business Enterprise | SLBE | Small Disadvantaged Business | SDB |
| Woman-Owned Small Business | WoSB | HUBZone Business | HUBZone |
| Service-Disabled Veteran Owned Small Business | SDVOSB | | |

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- | | | | |
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| State of California's Department of General Services | CADoGS | City of Los Angeles | LA |
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BIDDING DOCUMENTS

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

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ADDITIONAL DEDUCTIVE ALTERNATE	NAME, ADDRESS, AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONTRACTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	INDICATE VALUE OF SUBCONTRACT (MUST BE FILLED IN)	ADDITIONAL CODES (SLBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, SDVOSB)	WHERE CERTIFIED	OTHER CERTIFICATION PARTNERSHIP
	Name: <u>Scott Michael</u> Address: <u>PO Box 127</u> City: <u>San Marcos</u> State: <u>CA</u> Zip: <u>92079</u> Phone: <u>760-744-2807</u> Email: <u>scottmichaelinc@sbcglobal.net</u>	Constructor	068809	Plumbing	\$140,000 \$416,555			
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

ⓐ As appropriate, Bidder shall identify Subcontractor as one of the following and shall include a valid proof of certification (except for OBE, SLBE and ELBE):

- | | | | |
|---|--------|--|---------|
| Certified Minority Business Enterprise | MBE | Certified Woman Business Enterprise | WBE |
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ADDITIVE/DEDUCTIVE ALTERNATE	NAME, ADDRESS, AND TELEPHONE NUMBER OF SUBCONTRACTOR	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT (MUST BE FILLED OUT)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB	WHERE CERTIFIED	CHECK FOR JOINT VENTURE PARTNERSHIP
	Name: <u>K & Z Cabinets</u> Address: <u>1450 S. Grove Avenue</u> City: <u>Ontario</u> State: <u>CA</u> Zip: <u>91761</u> Phone: <u>(909) 947-3567</u> Email: <u>ichurch@kzcabi.com</u>	Constructor	319196	Cabinets	215,000 WR \$198,070	MBE/DBE	LA	✓
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

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Certified Disadvantaged Business Enterprise	DBE	Certified Disabled Veteran Business Enterprise	DVBE
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	Name: <u>Condon Johnson & Associates</u> Address: <u>9685 Via Excelencia STE106</u> City: <u>San Diego</u> State: <u>CA</u> Zip: <u>92126</u> Phone: <u>858 530 9165</u> Email: <u>Lerickson @ Condon-Johnson.com</u>	Construction	300068	Shoring	\$453,389			✓
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

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