

City of San Diego

CONTRACTOR'S NAME: EC Constructors Inc.
ADDRESS: 9834 River St., Lakeside, CA 92040
TELEPHONE NO.: (619) 440-7181 FAX NO.: _____
CITY CONTACT: Brittany Friedenreich, Contract Specialist, Email: BFriedenreic@sanidiego.gov
Phone No. (619) 533-3104
J.Sleiman / J.Borja / ss

BIDDING DOCUMENTS



FOR

FIRE RESCUE AIR OPERATIONS FACILITY

BID NO.: _____ **K-18-1732-DBB-3**
SAP NO. (WBS/IO/CC): _____ **S-15012**
CLIENT DEPARTMENT: _____ **1912**
COUNCIL DISTRICT: _____ **6**
PROJECT TYPE: _____ **BC**

THIS CONTRACT WILL BE 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

MAY 22, 2018

CITY OF SAN DIEGO

PUBLIC WORKS CONTRACTS

525 B STREET, SUITE 750, MS 908A

SAN DIEGO, CA 92101

ENGINEER OF WORK

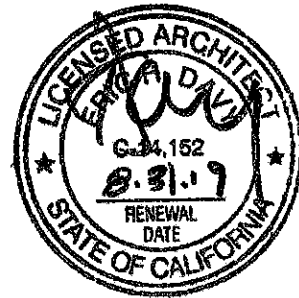
The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Architect:

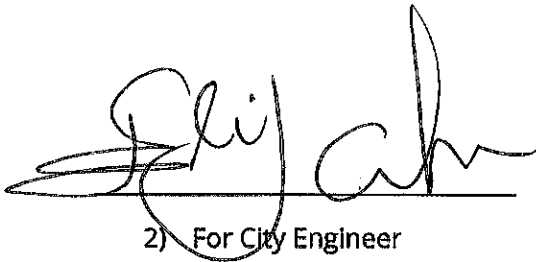


1) Registered Architect

4/3/2018
Date

Seal:





2) For City Engineer

4/3/18
Date

Seal

C60990

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NOTICE INVITING BIDS

1. **SUMMARY OF WORK:** This is the City of San Diego's (City) solicitation process to acquire Construction services for **Fire Rescue Air Operations Facility**. For additional information refer to Attachment A.
2. **FULL AND OPEN COMPETITION:** This contract is open to full competition and may be bid on by Contractors who are on the City's current Prequalified Contractors' List. For information regarding the Contractors Prequalified list visit the City's web site: <http://www.sandiego.gov>.
3. **ESTIMATED CONSTRUCTION COST:** The City's estimated construction cost for this project is **\$3, 875,000**.
4. **BID DUE DATE AND TIME ARE: May 22, 2018 at 2:00 PM**
5. **PREVAILING WAGE RATES APPLY TO THIS CONTRACT:** Refer to Attachment D.
6. **LICENSE REQUIREMENT:** The City has determined that the following licensing classification(s) are required for this contract: **B**
7. **SUBCONTRACTING PARTICIPATION PERCENTAGES:** Subcontracting participation percentages apply to this contract.
 - 7.1. 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	3.5%
2. ELBE participation	5.3%
3. Total mandatory participation	8.8%
 - 7.2. The Bid may be declared non-responsive if the Bidder fails to meet the following requirements:
 - 7.2.1. Attend the Mandatory Site Visit as described herein.
 - 7.2.2. Include SLBE-ELBE certified subcontractors at the overall mandatory participation percentage identified in this document; **OR**
 - 7.2.3. Submit 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.

8. **PRE-BID SITE VISIT:** All those wishing to submit a bid **MUST** 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. The Pre-Bid Site Visit is scheduled as follows:

Time: 10:00 AM
Date: May 3, 2018
Location: Montgomery-Gibbs Executive Airport. 3750 John J. Montgomery Drive, San Diego, CA 92123

9. **AWARD PROCESS:**

- 9.1. The Award of this contract is contingent upon the Contractor's compliance with all conditions of Award as stated within these documents and within the Notice of Intent to Award.
- 9.2. Upon acceptance of bids and determination of the apparent low bidder, the City will prepare the contract documents for execution within approximately 21 days of the date of the bid opening. The City will then award the contract upon receipt of properly signed Contract, bonds, and insurance documents.
- 9.3. This contract will be deemed executed and effective only upon the signing of the Contract by the Mayor or his designee and approval as to form by the City Attorney's Office.
- 9.4. The low Bid will be determined by Base Bid alone.
- 9.5. Once the low bid has been determined, the City may, at its sole discretion, award the contract for the Base bid alone.

10. **SUBMISSION OF QUESTIONS:**

- 10.1. The Director (or Designee) of the Public Works Department is 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. Any questions related to this solicitation shall be submitted to:

Public Works Contracts
525 B Street, Suite 750, MS 908A
San Diego, California, 92101
Attention: Brittany Friedenreich

OR:

BFriedenreic@sandiego.gov

- 10.2.** Questions received less than 14 days prior to the date for opening of Bids may not be considered.
- 10.3.** Questions or clarifications deemed by the City to be material shall be answered via issuance of an addendum and posted to the City's online bidding service.
- 10.4.** Only questions answered by formal written addenda shall be binding. Oral and other interpretations or clarifications shall be without legal effect. It is the Bidder's responsibility to be informed of any addenda that have been issued and to include all such information in its Bid.

INSTRUCTIONS TO BIDDERS

1. PREQUALIFICATION OF CONTRACTORS:

- 1.1. Contractors submitting a Bid must be pre-qualified for the total amount proposed, including 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 may be deemed **non-responsive** and ineligible for award. Complete information and links to the on-line prequalification application are available at:

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

- 1.2. The completed application must be submitted online no later than 2 weeks prior to the bid opening.
- 1.3. Due to the City's responsibility to protect the confidentiality of the contractors' information, 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™](#).

2. ELECTRONIC FORMAT RECEIPT AND OPENING OF BIDS: Bids will be received in electronic format (eBids) EXCLUSIVELY at the City of San Diego's electronic bidding (eBidding) site, at: <http://www.sandiego.gov/cip/bidopps/index.shtml> and are due by the date, and time shown on the cover of this solicitation.

- 2.1. **BIDDERS MUST BE PRE-REGISTERED** with the City's bidding system and possess a system-assigned Digital ID in order to submit an electronic bid.
- 2.2. The City's bidding system will automatically track information submitted to the site including IP addresses, browsers being used and the URLs from which information was submitted. In addition, the City's bidding system will keep a history of every login instance including the time of login, and other information about the user's computer configuration such as the operating system, browser type, version, and more. Because of these security features, Contractors who disable their browsers' cookies will not be able to log in and use the City's bidding system.
- 2.3. The City's electronic bidding system is responsible for bid tabulations. Upon the bidder's or proposer's entry of their bid, the system will ensure that all required fields are entered. **The system will not accept a bid for which any required information is missing.** This includes all necessary pricing, subcontractor listing(s) and any other essential documentation and supporting materials and forms requested or contained in these solicitation documents.
- 2.4. **BIDS REMAIN SEALED UNTIL BID DEADLINE.** eBids are transmitted into the City's bidding system via hypertext transfer protocol secure (https) mechanism using SSL 128-256 bit security certificates issued from Verisign/Thawte which encrypts data being

transferred from client to server. Bids submitted prior to the “Bid Due Date and Time” are not available for review by anyone other than the submitter which has until the “Bid Due Date and Time” to change, rescind or retrieve its proposal should it desire to do so.

- 2.5. BIDS MUST BE SUBMITTED BY BID DUE DATE AND TIME.** Once the bid deadline is reached, no further submissions are accepted into the system. Once the Bid Due Date and Time has lapsed, bidders, proposers, the general public, and City staff are able to immediately see the results on line. City staff may then begin reviewing the submissions for responsiveness, EOCB compliance and other issues. The City may require any Bidder to furnish statement of experience, financial responsibility, technical ability, equipment, and references.
- 2.6. RECAPITULATION OF THE WORK.** Bids shall not contain any recapitulation of the Work. Conditional Bids may be rejected as being non-responsive. Alternative proposals will not be considered unless called for.
- 2.7. BIDS MAY BE WITHDRAWN** by the Bidder only up to the bid due date and time.
 - 2.7.1. Important Note:** Submission of the electronic bid into the system may not be instantaneous. Due to the speed and capabilities of the user’s internet service provider (ISP), bandwidth, computer hardware and other variables, it may take time for the bidder’s submission to upload and be received by the City’s eBidding system. It is the bidder’s sole responsibility to ensure their bids are received on time by the City’s eBidding system. The City of San Diego is not responsible for bids that do not arrive by the required date and time.
- 2.8. ACCESSIBILITY AND AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE:** To request a copy of this solicitation in an alternative format, contact the Public Works Contract Specialist listed on the cover of this solicitation at least five (5) working days prior to the Bid/Proposal due date to ensure availability.

3. ELECTRONIC BID SUBMISSIONS CARRY FULL FORCE AND EFFECT

- 3.1.** The bidder, by submitting its electronic bid, acknowledges that doing so carries the same force and full legal effect as a paper submission with a longhand (wet) signature.
- 3.2.** By submitting an electronic bid, the bidder certifies that the bidder has thoroughly examined and understands the entire Contract Documents (which consist of the plans and specifications, drawings, forms, affidavits and the solicitation documents), and that by submitting the eBid as its bid proposal, the bidder acknowledges, agrees to and is bound by the entire Contract Documents, including any addenda issued thereto, and incorporated by reference in the Contract Documents.
- 3.3.** The Bidder, by submitting its electronic bid, agrees to and certifies under penalty of perjury under the laws of the State of California, that the certification, forms and affidavits submitted as part of this bid are true and correct.

- 3.4.** The Bidder agrees to the construction of the project as described in Attachment “A – Scope of Work” for the City of San Diego, in accordance with the requirements set forth herein for the electronically submitted prices. The Bidder guarantees the Contract Price for a period of 120 days from the date of Bid opening. 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.
- 4. 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.
- 5. CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM:**
- 5.1. Prior** to the Award of the Contract or Task Order, you and your Subcontractors and Suppliers must register with the City’s web-based vendor registration and bid management system. For additional information go to:

<http://www.sandiego.gov/purchasing/bids-contracts/vendorreg.shtml>.
- 5.2.** The City 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 City 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.
- 6. 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 7-6, “The Contractors Representative” in The GREENBOOK and 7-6.1 in The WHITEBOOK.
- 7. PREVAILING WAGE RATES WILL APPLY:** Refer to Attachment D.
- 8. SUBCONTRACTING PARTICIPATION PERCENTAGES:** Subcontracting participation percentages apply to this contract. Refer to Attachment E.
- 9. INSURANCE REQUIREMENTS:**
- 9.1.** All certificates of insurance and endorsements required by the contract are to be provided upon issuance of the City’s Notice of Intent to Award letter.

9.2. 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.

10. **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") http://www.greenbookspecs.org/	2015	PWPI070116-01
City of San Diego Standard Specifications for Public Works Construction ("The WHITEBOOK")* https://www.sandiego.gov/publicworks/edocref/greenbook	2015	PWPI070116-02
City of San Diego Standard Drawings* https://www.sandiego.gov/publicworks/edocref/standarddraw	2016	PWPI070116-03
Citywide Computer Aided Design and Drafting (CADD) Standards https://www.sandiego.gov/publicworks/edocref/drawings	2016	PWPI092816-04
California Department of Transportation (CALTRANS) Standard Specifications – http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2015	PWPI092816-05
CALTRANS Standard Plans http://www.dot.ca.gov/des/oe/construction-contract-standards.html	2015	PWPI092816-06
California Manual on Uniform Traffic Control Devices Revision 1 (CA MUTCD Rev 1) - http://www.dot.ca.gov/trafficops/camutcd/	2014	PWPI092816-07
<p>NOTE: *Available online under Engineering Documents and References at: http://www.sandiego.gov/publicworks/edocref/index.shtml</p>		

11. **CITY'S RESPONSES AND ADDENDA:** The City, at its discretion, may respond to any or all questions submitted in writing via the City's eBidding web site in the **form of an addendum**. No other responses to questions, oral or written shall be of any force or effect with respect to this solicitation. The changes to the Contract Documents through addenda are made effective as though originally issued with the Bid. The Bidders shall acknowledge the receipt of Addenda at the time of bid submission.

12. **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.

13. CONTRACT PRICING: This solicitation is for a Lump Sum contract with Unit Price provisions as set forth herein. The Bidder agrees to perform construction services for the City of San Diego in accordance with these contract documents for the prices listed below. The Bidder further agrees to guarantee the Contract Price for a period of 120 days from the date of Bid opening. The duration of the Contract Price guarantee may be extended, by mutual consent of the parties, by the number of days required for the City to obtain all items necessary to fulfill all contractual conditions.

14. SUBCONTRACTOR INFORMATION:

14.1. LISTING OF SUBCONTRACTORS. In accordance with the requirements provided in the "Subletting and Subcontracting Fair Practices Act" of the California Public Contract Code, the Bidder shall provide the **NAME** and **ADDRESS** of each Subcontractor who will perform work, labor, render services or who 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 state within the description, whether the subcontractor is a **CONSTRUCTOR, CONSULTANT** or **SUPPLIER**. The Bidder shall state the **DIR REGISTRATION NUMBER** for all subcontractors and shall further state within the description, the **PORTION** of the work which will be performed 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 may 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 for which Bidders are seeking recognition towards achieving any mandatory, voluntary (or both) subcontracting participation goals.

14.2. LISTING OF SUPPLIERS. Any Bidder seeking the recognition of Suppliers of equipment, materials, or supplies obtained from third party Suppliers towards achieving any mandatory or voluntary (or both) subcontracting participation goals shall provide, at a minimum, the **NAME, LOCATION (CITY), DIR REGISTRATION NUMBER** and the **DOLLAR VALUE** of each supplier. The Bidder will be credited up to 60% of the amount to be paid to the Suppliers for materials and supplies unless vendor manufactures or substantially alters materials and supplies, in which case, 100% will be credited. The Bidder is to indicate within the description whether the listed firm is a supplier or manufacturer. If no indication is provided, the listed firm will be credited at 60% of the listed dollar value for purposes of calculating the Subcontractor Participation Percentage.

- 14.3. LISTING OF SUBCONTRACTORS OR SUPPLIERS FOR ALTERNATES.** For subcontractors or suppliers to be used on additive or deductive alternate items, in addition to the above requirements, bidder shall further note "ALTERNATE" and alternate item number within the description.
- 15. SUBMITTAL OF "OR EQUAL" ITEMS:** See Section 4-1.6, "Trade Names or Equals" in The WHITEBOOK and as amended in the SSP.
- 16. AWARD:**
- 16.1.** The Award of this contract is contingent upon the Contractor's compliance with all conditions precedent to Award.
- 16.2.** Upon acceptance of a Bid, the City 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.
- 16.3.** This contract will be deemed executed and effective only upon the signing of the Contract by the Mayor or his designee and approval as to form the City Attorney's Office.
- 17. 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.
- 18. 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.
- 19. ONLY ONE BID PER CONTRACTOR SHALL BE ACCEPTED:** 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.
- 20. 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 within these documents.

21. BIDDER'S GUARANTEE OF GOOD FAITH (BID SECURITY) FOR DESIGN-BID-BUILD CONTRACTS:

- 21.1.** For bids \$250,000 and above, 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 City of San Diego for an amount of not less than 10% of the total bid amount.
- 21.2.** This check or bond, and the monies represented thereby, will be held by the City 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.
- 21.3.** 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 City; and the Surety agrees that it will pay to the City the damages, not exceeding the sum of 10% of the amount of the Bid, that the City may suffer as a result of such failure.
- 21.4.** At the time of bid submission, bidders must upload and submit an electronic PDF copy of the aforementioned bid security. Whether in the form of a cashier's check, a properly certified check or an approved corporate surety bond payable to the City of San Diego, the bid security must be uploaded to the City's eBidding system. Within twenty-four (24) hours after the bid due date and time, the first five (5) apparent low bidders must provide the City with the original bid security.
- 21.5.** Failure to submit the electronic version of the bid security at the time of bid submission AND failure to provide the original within twenty-four (24) hours may cause the bid to be rejected and deemed **non-responsive**.

22. AWARD OF CONTRACT OR REJECTION OF BIDS:

- 22.1.** This contract may be awarded to the lowest responsible and reliable Bidder.
- 22.2.** Bidders shall complete ALL eBid forms as required by this solicitation. Incomplete eBids will not be accepted.
- 22.3.** The City reserves the right to reject any or all Bids, to waive any informality or technicality in Bids received, and to waive any requirements of these specifications as to bidding procedure.
- 22.4.** Bidders will not be released on account of their errors of judgment. Bidders may be released only upon receipt by the City within 3 Working Days of the bid opening, written notice from the Bidder which shows proof of honest, credible, clerical error of a material nature, free from fraud or fraudulent intent; and of evidence that reasonable care was observed in the preparation of the Bid.

- 22.5.** 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 the San Diego Municipal Code.
- 22.6.** The City of San Diego will not discriminate in the award of contracts with regard to race, religion creed, color, national origin, ancestry, physical handicap, marital status, sex or age.
- 22.7.** Each Bid package properly signed as required by these specifications shall constitute a firm offer which may be accepted by the City within the time specified herein.
- 22.8.** The City reserves the right to evaluate all Bids and determine the lowest Bidder on the basis of the base bid and any proposed alternates or options as detailed herein.

23. BID RESULTS:

- 23.1.** The availability of the bids on the City's eBidding system 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 notation of such will be made on the eBidding system. The new ranking and apparent low bidder will be adjusted accordingly.
- 23.2.** To obtain the bid results, view the results on the City's web site, or request the results by U.S. mail and provide a self-addressed, stamped envelope. If requesting by mail, be sure to reference the bid name and number. The bid tabulations will be mailed to you upon their completion. The results will not be given over the telephone.

24. THE CONTRACT:

- 24.1.** The Bidder to whom award is made shall execute a written contract with the City 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.
- 24.2.** 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 City, 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.
- 24.3.** 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.

- 24.4.** Pursuant to the San Diego City Charter section 94, the City 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.
- 24.5.** 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 Mayor or designee and approval as to form the City Attorney's Office. If the Apparent Low Bidder does not execute the Contract or submit required documents and information, the City 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.
- 25. 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.
- 26. CITY STANDARD PROVISIONS:** This contract is subject to the following standard provisions. See The WHITEBOOK for details.
- 26.1.** The City of San Diego Resolution No. R-277952 adopted on May 20, 1991 for a Drug-Free Workplace.
- 26.2.** The City of San Diego Resolution No. R-282153 adopted on June 14, 1993 related to the Americans with Disabilities Act.
- 26.3.** The City of San Diego Municipal Code §22.3004 for Contractor Standards.
- 26.4.** The City of San Diego's Labor Compliance Program and the State of California Labor Code §§1771.5(b) and 1776.
- 26.5.** 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.

26.6. The City's Equal Benefits Ordinance (EBO), Chapter 2, Article 2, Division 43 of The San Diego Municipal Code (SDMC).

26.7. The City's Information Security Policy (ISP) as defined in the City's Administrative Regulation 90.63.

27. PRE-AWARD ACTIVITIES:

27.1. The contractor selected by the City to execute a contract for this Work shall submit the required documentation as specified in the herein and in the Notice of Award. Failure to provide the information as specified may result in the Bid being rejected as **non-responsive**.

27.2. The decision that bid is non-responsive for failure to provide the information required within the time specified shall be at the sole discretion of the City.

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND

FAITHFUL PERFORMANCE BOND AND LABOR AND MATERIALMEN'S BOND:

EC Constructors Inc., a corporation, as principal, and Hartford Fire 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 a municipal corporation in the sum of Three Million Two Hundred Fourteen Thousand Five Hundred Forty Four Dollars and Zero Cents (\$3,214,544.00), for the faithful performance of the annexed contract, and in the sum of Three Million Two Hundred Fourteen Thousand Five Hundred Forty Four Dollars and Zero Cents (\$3,214,544.00), for the benefit of laborers and materialmen designated below.

Conditions:

If the Principal shall faithfully perform the annexed contract with the City of 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 Article 2. Claimants, (iii) public works of Improvement commencing with Civil Code Section 9100 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.

PERFORMANCE BOND, LABOR AND MATERIALMEN'S BOND (continued)

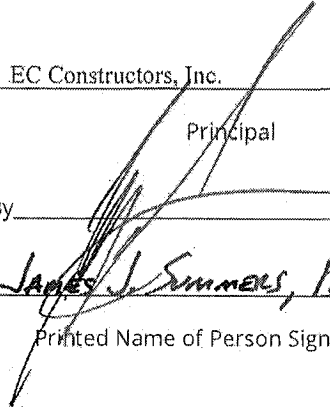
The Surety shall pay reasonable attorney's fees should suit be brought to enforce the provisions of this bond.

Dated June 15, 2018

Approved as to Form

EC Constructors, Inc.

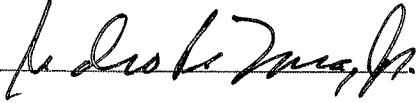
Principal

By 

JAMES J. SUMMERS, PRINCIPAL

Printed Name of Person Signing for Principal

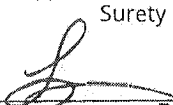
Mara W. Elliott, City Attorney

By 

Deputy City Attorney

Hartford Fire Insurance Company

Surety

By 

Lawrence F. McMahon
Attorney-in-fact

Approved:

By 

Stephen Samara
Principal Contract Specialist
Public Works Department

One Pointe Drive, 6th Floor

Local Address of Surety

Brea, CA 92821-2333

Local Address (City, State) of Surety

(714) 674-1307

Local Telephone No. of Surety

Premium \$ \$34,831.00 Premium is for Contract Term & Subject to Adjustment Based on Final Contract Price

Bond No. 72BC SHU4839

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 JUN 15 2018 before me, Rachel A. Mullen, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

personally appeared Lawrence F. McMahon
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(~~##~~) whose name(~~##~~) is/~~##~~ subscribed to the within instrument and acknowledged to me that he/~~##~~ executed the same in his/~~##~~ authorized capacity(~~##~~), and that by his/~~##~~ signature(~~##~~) on the instrument the person(~~##~~), or the entity upon behalf of which the person(~~##~~) 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 Rachel A. Mullen
Signature of Notary Public Rachel A. Mullen



Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of the form to another document.

Description of Attached Document

Title or Type of Document: _____

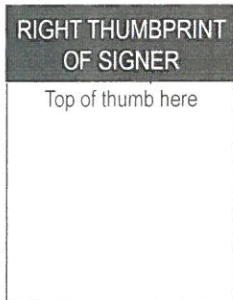
Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____



Signer is Representing:
Surety Company

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____



Signer is Representing:

POWER OF ATTORNEY

Direct Inquiries/Claims to:

THE HARTFORD

BOND, T-4

One Hartford Plaza

Hartford, Connecticut 06155

call: 888-266-3488 or fax: 860-757-5835

Agency Code: 72-160200

KNOW ALL PERSONS BY THESE PRESENTS THAT:

- Hartford Fire Insurance Company, a corporation duly organized under the laws of the State of Connecticut
- Hartford Casualty Insurance Company, a corporation duly organized under the laws of the State of Indiana
- Hartford Accident and Indemnity Company, a corporation duly organized under the laws of the State of Connecticut
- Hartford Underwriters Insurance Company, a corporation duly organized under the laws of the State of Connecticut
- Twin City Fire Insurance Company, a corporation duly organized under the laws of the State of Indiana
- Hartford Insurance Company of Illinois, a corporation duly organized under the laws of the State of Illinois
- Hartford Insurance Company of the Midwest, a corporation duly organized under the laws of the State of Indiana
- Hartford Insurance Company of the Southeast, a corporation duly organized under the laws of the State of Florida

having their home office in Hartford, Connecticut, (hereinafter collectively referred to as the "Companies") do hereby make, constitute and appoint, **up to the amount of unlimited:**

Lawrence F. McMahon, James Baldassare Jr., Sarah Myers, Maria Guise, Lilia Robinson, Charlotte Aquino, Jennifer L. Clampert, Janice Martin
of
San Diego, CA

their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety(ies) only as delineated above by , and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, and as authorized by a Resolution of the Board of Directors of the Companies on August 1, 2009 the Companies have caused these presents to be signed by its Vice President and its corporate seals to be hereto affixed, duly attested by its Assistant Secretary. Further, pursuant to Resolution of the Board of Directors of the Companies, the Companies hereby unambiguously affirm that they are and will be bound by any mechanically applied signatures applied to this Power of Attorney.



Wesley W. Cowling

Wesley W. Cowling, Assistant Secretary

M. Ross Fisher

M. Ross Fisher, Vice President

STATE OF CONNECTICUT }
COUNTY OF HARTFORD } ss. Hartford

On this 12th day of July, 2012, before me personally came M. Ross Fisher, to me known, who being by me duly sworn, did depose and say: that he resides in the County of Hartford, State of Connecticut; that he is the Vice President of the Companies, the corporations described in and which executed the above instrument; that he knows the seals of the said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed by authority of the Boards of Directors of said corporations and that he signed his name thereto by like authority.



CERTIFICATE

Kathleen T. Maynard

Kathleen T. Maynard
Notary Public

My Commission Expires July 31, 2016

I, the undersigned, Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of
Signed and sealed at the City of Hartford. June 15, 2018



Gary W. Stumper

Gary W. Stumper, Vice President

ATTACHMENTS

ATTACHMENT A
SCOPE OF WORK

SCOPE OF WORK

1. **SCOPE OF WORK:** The project scope is for tenant building improvements of the existing FAA Flight Service Station (FSS) located at Montgomery-Gibbs Executive Airport (MYF). The scope includes the remodel of the interior of the facility to meet current 'essential facility' and City of San Diego Fire Station Standards.
 - 1.1. The Work shall be performed in accordance with:
 - 1.1.1. The Notice Inviting Bids and Plans numbered **39665-1-D** through **39665-111-D**, inclusive.
2. **LOCATION OF WORK:** Fire Rescue Air Operations Facility, Montgomery-Gibbs Executive Airport
3. **CONTRACT TIME:** The Contract Time for completion of the Work, shall be **210 Working Days**.

ATTACHMENT B
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ATTACHMENT C
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ATTACHMENT D
PREVAILING WAGES

PREVAILING WAGES

1. **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.
 - 1.1. **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.
 - 1.1.1. 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.
 - 1.1.2. 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.
 - 1.2. **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. This shall be in addition to any other applicable penalties allowed under Labor Code sections 1720 – 1861.

- 1.3. 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.
- 1.3.1.** Contractor and their subcontractors shall also furnish records specified in Labor Code section 1776 directly to the Labor Commissioner in the manner required by Labor Code section 1771.4.
- 1.4. 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.
- 1.5. 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 contractors 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.
- 1.6. 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.
- 1.7. 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."
- 1.8. 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.

- 1.9. Contractor and Subcontractor Registration Requirements.** This project is subject to compliance monitoring and enforcement by the DIR. A contractor or subcontractor shall not be qualified to bid on, be listed in a bid or proposal, subject to the requirements of section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, unless currently registered and qualified to perform public work pursuant to Labor Code section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.
- 1.9.1.** 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.
- 1.9.2.** 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 for themselves and all listed subcontractors to the City at the time of bid or proposal due date or upon request.
- 1.10. Stop Order.** For Contractor or its subcontractors engaging in the performance of any public work contract without having been registered in violation of Labor Code sections 1725.5 or 1771.1, the Labor Commissioner shall issue and serve a stop order prohibiting the use of the unregistered contractors or unregistered subcontractor(s) on ALL public works until the unregistered contractor or unregistered subcontractor(s) is registered. Failure to observe a stop order is a misdemeanor.
- 1.11. List of all Subcontractors.** The City may ask Contractor for the most current list of subcontractors (regardless of tier), along with their DIR registration numbers, utilized on this Agreement at any time during performance of this contract, and Contractor shall provide the list within ten (10) working days of the City's request. Additionally, Contractor shall provide the City with a complete list of all subcontractors utilized on this contract (regardless of tier), within ten working days of the completion of the contract, along with their DIR registration numbers. The City shall withhold final payment to Contractor until at least 30 days after this information is provided to the City.

1.12. Exemptions for Small Projects. There are limited exemptions for installation, alteration, demolition, or repair work done on projects of \$25,000 or less. The Contractor shall still comply with Labor Code sections 1720 et. seq. The only recognized exemptions are listed below:

1.12.1. Registration. The Contractor will not be required to register with the DIR for small projects. (Labor Code section 1771.1)

1.12.2. Certified Payroll Records. The records required in Labor Code section 1776 shall be required to be kept and submitted to the City of San Diego, but will not be required to be submitted online with the DIR directly. The Contractor will need to keep those records for at least three years following the completion of the Contract. (Labor Code section 1771.4).

1.12.3. List of all Subcontractors. The Contractor shall not be required to hire only registered subcontractors and is exempt from submitting the list of all subcontractors that is required in section 4.20.11 above. (Labor code section 1773.3).

ATTACHMENT E
SUPPLEMENTARY SPECIAL PROVISIONS

SUPPLEMENTARY SPECIAL PROVISIONS

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

1. The **2015 Edition** of the Standard Specifications for Public Works Construction (The "GREENBOOK").
2. The **2015 Edition** of the City of San Diego Standard Specifications for Public Works Construction (The "WHITEBOOK"), including the following:
 - a) General Provisions (A) for all Contracts.

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

- 1-2 TERMS AND DEFINITIONS.** To the "WHITEBOOK", item 54, "Normal Working Hours", ADD the following:

The **Normal Working Hours** are **7:00 AM to 5:30 PM**.

SECTION 2 - SCOPE AND CONTROL OF WORK

- 2-3.2 Self Performance.** To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. You shall perform, with your own organization, Contract Work amounting to at least 50% of the base Bid **AND** 50% of any alternates.
2. The self performance percentage requirement will be waived for Prime Contractors meeting the Class B License requirement of this Contract.

- 2-9.1 Permanent Survey Markers.** To the "WHITEBOOK", item 3, DELETE in its entirety and SUBSTITUTE with the following:

3. You 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. CMFS (or the private owner for Permit Work) shall perform the following:
 - 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.

- c) File a Corner Record or Record of Survey with the County Surveyor after re-establishment of the disturbed controlling survey monuments.

**ADD:
2-10**

AUTHORITY OF THE BOARD AND THE ENGINEER. To the "GREENBOOK", Paragraph (2), DELETE in its entirety and SUBSTITUTE with the following:

The decision of the Engineer is final and binding on all questions relating to: quantities; acceptability of material, equipment, or work; execution, progress or sequence of work; requests for information (RFI), and interpretation of the Plans, Specifications, or other Contract Documents. This shall be precedent to any payment under the Contract. The Engineer shall be the single point of contact and shall be included in all communications.

2-16

CONTRACTOR REGISTRATION AND ELECTRONIC REPORTING SYSTEM. To the "WHITEBOOK", item 1, DELETE in its entirety.

SECTION 3 – CHANGES IN WORK

3-5.1

Claims. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

**ADD:
3-5.1**

Claims.

1. A Claim is a written demand by you that seeks an adjustment in the Contract Price, Contract Time, or other relief associated with a dispute arising under or relating to the Contract, including a breach of any provision thereof. A voucher, invoice, or other routine request for payment is not a Claim.
2. A Claim shall conform to these specifications and may be considered after the City has previously denied a request by you for a Change Order seeking the demanded relief.
3. You shall submit a Claim to the Engineer if a dispute occurs that arises from or relates to the Contract. The Claim shall seek all relief to which you assert you are entitled as a result of the event(s) giving rise to the dispute. Your failure to process a Claim in accordance with these specifications shall constitute a waiver of all relief associated with the dispute. Claims are subject to 6-11, "Right to Audit".
4. You shall continue to perform the Services and Work and shall maintain the Schedule during any dispute proceedings. The Engineer will continue to make payments for undisputed Services and Work.
5. The City's Claims process specified herein shall not relieve you of your statutory obligations to present claims prior to any action under the California Government Code.

3-5.1.1 Initiation of Claim.

1. You shall promptly, but no later than 30 Days after the event(s) giving rise to the Claim, deliver the Claim to the Engineer.
2. You shall not process a Claim unless the Engineer has previously denied a request by you for a Change Order that sought the relief to be pursued in the claim.

3-5.1.1.1 Claim Certification Submittal.

1. If your Claim seeks an increase in the Contract Price, the Contract Time, or both, submit with the Claim an affidavit certifying the following:
 - a) The Claim is made in good faith and covers all costs and delays to which you are entitled as a result of the event(s) giving rise to the Claim.
 - b) The amount claimed accurately reflects the adjustments in the Contract Price, the Contract Time, or both to which you believe you are entitled.
 - c) All supporting costs and pricing data are current, accurate, and complete to the best of your knowledge. The cost breakdown per item of Work shall be supplied.
 - d) You shall ensure that the affidavit is executed by an official who has the authority to legally bind you.

3-5.1.2 Initial Determination.

1. The Engineer will respond in writing to your Claim within 30 Days of receipt of the Claim.

3-5.1.3 Settlement Meeting.

1. If you disagree with the Initial Determination, you shall request a Settlement Meeting within 30 Days. Upon receipt of this request, the Engineer will schedule the Settlement Meeting within 15 Working Days.

3-5.1.4 City's Final Determination.

1. If a settle agreement is not reached, the City shall make a written Final Determination within 10 Working Days after the Settlement Meeting.
2. If you disagree with the City's Final Determination, notify the Engineer in writing of your objection within 15 Working Days after receipt of the written determination and file a "Request for Mediation" in accordance with 3-5.2, "Dispute Resolution Process".
3. Failure to give notice of objection within the 15 Working Days period shall waive your right to pursue the Claim.

3-5.1.5 Mandatory Assistance.

1. If a third party dispute, litigation, or both arises out of or relates in any way to the Services provided under the Contract, upon the City's request, you shall agree to assist in resolving the dispute or litigation. Your assistance includes, but is not limited to the following:
 - a) Providing professional consultations.
 - b) Attending mediations, arbitrations, depositions, trials, or any event related to the dispute resolution and litigation.

3-5.1.5.1 Compensation for Mandatory Assistance.

1. The City will reimburse you for reasonable fees and expenses incurred by you for any required assistance rendered in accordance with 3-5.1.5, "Mandatory Assistance" as Extra Work.
2. The Engineer will determine whether these fees and expenses were necessary due to your conduct or failure to act.
3. If the Engineer determines that the basis of the dispute or litigation in which these fees and expenses were incurred were the result of your conduct or your failure to act in part or in whole, you shall reimburse the City for any payments made for these fees and expenses.
4. Reimbursement may be through any legal means necessary, including the City's withholding of your payment.

3-5.2.3 Selection of Mediator. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. A single mediator, knowledgeable in construction aspects and acceptable to both parties, shall be used to mediate the dispute.
2. To initiate mediation, the initiating party shall serve a Request for Mediation at the American Arbitration Association (AAA) on the opposing party.
3. If AAA is used, the initiating party shall concurrently file with AAA a "Request for Mediation" along with the appropriate fees, a copy of requested mediators marked in preference order, and a preference for available dates.
4. If AAA is selected to coordinate the mediation (Administrator), within 10 Working Days from the receipt of the initiating party's Request for Mediation, the opposing party shall file the following:
 - a) A copy of the list of the preferred mediators listed in preference order after striking any mediators to which they have any objection.
 - b) A preference for available dates.
 - c) Appropriate fees.
5. If the parties cannot agree on a mediator, then each party shall select a mediator and those mediators shall select the neutral third party to mediate the matter.

3-5.3 Forum of Litigation. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. It is the express intention that all legal actions and proceedings related to the Contract or Agreement with the City or to any rights or any relationship between the parties arising therefrom shall be solely and exclusively initiated and maintained in courts of the State of California for the County of San Diego.

ADD:

3-5.4 Pre-judgment Interest.

1. The parties stipulate that if a judgment is entered against a party for breaching this Contract, the pre-judgment interest shall be two percent (2%) per annum.

SECTION 4 - CONTROL OF MATERIALS

4-1.3.5 Special Inspection. To the "WHITEBOOK", ADD the following:

1. The payment for special inspection Work specified under this section shall be paid in accordance with 4-1.3.4.1, "Payment".

4-1.3.6 Preapproved Materials. To the "WHITEBOOK", ADD the following:

3. You shall submit in writing a list of all products to be incorporated in the Work that are on the AML.

4-1.6 Trade Names or Equals. To the "WHITEBOOK", ADD the following:

11. You shall submit your list of proposed substitutions for an "equal" item **no less than 15 Working Days prior to the Bid due date** and on the City's Product Submittal Form available at:

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

SECTION 5 - UTILITIES

5-1.1 General. To the "WHITEBOOK", ADD the following:

9. **90 Calendar Days** prior to any paving work, you shall notify the utility owner to provide them adequate time to adjust their utility box frame and cover to finish grade.

5-2 PROTECTION. To the "WHITEBOOK", item 2, ADD the following:

- g) Refer to **Appendix H** for more information on the protection of AMI devices.

5-6 COOPERATION. To the "GREENBOOK", ADD the following:

2. Notify SDG&E at least 10 Working Days prior to excavating within 10 feet of SDG&E Underground High Voltage Transmission Power Lines (69 KV and higher).

SECTION 6 - PROSECUTION, PROGRESS AND ACCEPTANCE OF WORK

6-1.1 Construction Schedule. To the "WHITEBOOK", item 9, DELETE in its entirety and SUBSTITUTE with the following:

9. Inclusive to the Contract Time, include 15 Working Days to the Schedule for the generation of the Punchlist. You shall Work diligently to complete all Punchlist items within 30 Working Days after the Engineer provides the Punchlist.

To the "WHITEBOOK", item 22, subsection b, DELETE in its entirety and SUBSTITUTE with the following:

- b) A curve value percentage comparison between the Contract Price and the updated cash flow forecast for each Project ID included in the Contract Documents. Curve values shall be set on a scale from 0% to 100% in intervals of 5% of the Contract Time. Refer to the Sample City Invoice materials in the Contract Documents and use the format shown. Your invoice amounts shall be supported by this curve value percentage. For previous periods, use the actual values and percentages and update the curve value percentages accordingly. See "Cash Flow Curve Fitting Example" at the location below:

<https://www.sandiego.gov/publicworks/edocref>

ADD:

6-3.2.1.1 Environmental Document.

1. The City of San Diego has prepared a **Notice of Exemption (NOE)** for **Fire Rescue Air Operations Facility**, Project No. **S-15012**, as referenced in the Contract Appendix. You shall comply with all requirements of the **Notice of Exemption** as set forth in **Appendix A**.
2. Compliance with the City's environmental document shall be included in the Contract Price.

6-8.3.1 Defective Work. To the "WHITEBOOK", item 6, DELETE in its entirety and SUBSTITUTE with the following:

6. For Building Projects which require a certificate of occupancy, not including sewer and water facilities, if you fail to correct the defective Work listed on the City's Punchlist within 45 Days after the Contract Time, you shall reimburse the City for all

costs to provide inspection services required to monitor Work beyond the 45 Days. The City shall bill you for the additional inspection at the City's established rates.

SECTION 7 - RESPONSIBILITIES OF THE CONTRACTOR

7-3 INSURANCE. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

7-3 INSURANCE.

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

7-3.1 Policies and Procedures.

1. You shall 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 shall 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. The payment for insurance shall be included in the Contract Price as bid by you. 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 shall 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 shall 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 shall 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 shall be no endorsement or modification limiting the scope of coverage for either "insured vs. insured" claims or contractual liability. You shall maintain the same or equivalent insurance for at least 10 years following completion of the Work.
4. All costs of defense shall be outside the policy limits. Policy coverage shall 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 shall 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 shall be outside the limits of the policy.

7-3.2.3 Contractors Pollution Liability Insurance.

1. You shall procure and maintain at your expense or require your 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 shall be outside the limits of the policy. Any such insurance provided by your Subcontractor instead of you shall be approved separately in writing by the City.
3. For approval of a substitution of your Subcontractor's insurance, you shall 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 shall not exceed \$25,000 per claim.
4. Contractual liability shall include coverage of tort liability of another party to pay for bodily injury or property damage to a third person or organization. There shall 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 shall be procured before the Work commences and shall be maintained for the Contract Time. Claims Made policies shall be procured before the Work commences, shall be maintained for the Contract Time, and shall include a 12 month extended Claims Discovery Period applicable to this contract or the existing policy or policies that shall 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 shall 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 shall provide at your expense, and maintain until Final Acceptance of the Work, a Special Form Builders Risk Policy or Policies. This insurance shall 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 shall 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 shall include material or portions of the Work located away from the Site but intended for use at the Site and shall cover material or portions of the Work in transit. The policy or policies shall include as insured property scaffolding, falsework, and temporary buildings located at the Site. The policy or policies shall cover the cost of removing debris, including demolition.
3. The policy or policies shall provide that all proceeds thereunder shall be payable to the City as Trustee for the insured, and shall name the City, the Contractor, Subcontractors, and Suppliers of all tiers as named insured. The City, 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 shall 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 shall be apportioned among the parties except for the City as follows: if there is more than one claimant for a single occurrence, then each claimant shall 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 City shall be entitled to 100% of its loss. You shall pay the City any portion of that loss not covered because of a deductible at the same time the proceeds of the insurance are paid to the City as trustee.
5. Any insured, other than the City, making claim to which a deductible applies shall be responsible for 100% of the loss not insured because of the deductible. Except as provided for under California law, the policy or policies shall 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.

7-3.3 Rating Requirements. Except for the State Compensation Insurance Fund, all insurance required by this Contract as described herein shall 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 City 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 shall 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 City 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 shall 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.

1. You shall 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.
2. To the fullest extent allowed by law e.g., California Insurance Code §11580.04, the policy shall be endorsed to include the City and its respective elected officials, officers, employees, agents, and representatives as additional insured.
3. The additional insured coverage for projects for which the Engineer's Estimate is \$1,000,000 or more shall 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.
4. The additional insured coverage for projects for which the Engineer's Estimate is less than \$1,000,000 shall 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 shall 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 and its elected officials, officers, employees, agents and representatives. Further, it shall provide that any insurance maintained by the City and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

7-3.5.1.3 Project General Aggregate Limit. The policy or policies shall 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 shall reduce the Designated Construction Project General Aggregate Limit. The Designated Construction Project General Aggregate Limit shall 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 shall be endorsed to include the City 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.

1. The policy or policies shall be endorsed to include as an Insured the City 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 shall not provide any duty of indemnity coverage for the active negligence of the City 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.

2. In any case where a claim or loss encompasses the negligence of the Insured and the active negligence of the City and its respective elected officials, officers, employees, agents, and representatives that are not covered because of California Insurance Code §11580.04, the insurer's obligation to the City and its respective elected officials, officers, employees, agents, and representatives shall 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 shall 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 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 and its elected officials, officers, employees, agents and representatives shall be in excess of your insurance and shall not contribute to it.

- 7-3.5.3.3 Severability of Interest.** For Contractors Pollution Liability Insurance, the policy or policies shall provide that your insurance shall 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 shall provide cross-liability coverage.
- 7-3.5.5 Builders Risk Endorsements.**
- 7-3.5.5.1 Waiver of Subrogation.** The policy or policies shall be endorsed to provide that the insurer will waive all rights of subrogation against the City, 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.
- 7-3.5.5.2 Builders Risk – Partial Utilization.** If the City desires to occupy or use a portion or portions of the Work prior to Acceptance in accordance with this Contract, the City will notify you and you shall immediately notify your Builder's Risk insurer and obtain an endorsement that the policy or policies shall not be cancelled or lapse on account of any such partial use or occupancy. You shall obtain the endorsement prior to the City's occupation and use.
- 7-3.6 Deductibles and Self-Insured Retentions.** You shall pay for all deductibles and self-insured retentions. You shall disclose deductibles and self-insured retentions to the City at the time the evidence of insurance is provided.
- 7-3.7 Reservation of Rights.** The City 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 City. The City 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 shall notify the City 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 shall follow the form of the primary policy or policies e.g., all endorsements.
- 7-3.10 Architects and Engineers Professional Insurance (Errors and Omissions Insurance)**
1. For Contracts with required engineering services (e.g., Design-Build, preparation of engineered Traffic Control Plans (TCP), and etc.) by you, you shall keep or require all of your employees or Subcontractors, who provide professional engineering services under this contract, Professional Liability coverage with a limit of **\$1,000,000** per claim and **\$2,000,000** annual aggregate in full force and effect.

2. You shall ensure the following:
 - a) The policy retroactive date is on or before the date of commencement of the Project.
 - b) The policy will be maintained in force for a period of 3 years after completion of the Project or termination of this Contract, whichever occurs last. You agree that for the time period specified above, there will be no changes or endorsements to the policy that affect the specified coverage.
3. If professional engineering services are to be provided solely by the Subcontractor, you shall:
 - a) Certify this to the City in writing and
 - b) Agree in writing to require the Subcontractor to procure Professional Liability coverage in accordance with the requirements set forth above.

7-4 NOT USED. To the "GREENBOOK", DELETE in its entirety and SUBSTITUTE with the following:

7-4 WORKERS' COMPENSATION INSURANCE AND EMPLOYERS LIABILITY INSURANCE.

1. In accordance with the provisions of §3700 of the California Labor Code, you shall 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, 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 shall 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 requires 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 shall comply with such provisions before commencing the Work as required by §1861 of the California Labor Code.

7-4.1 Waiver of Subrogation. The policy or policies shall be endorsed to provide that the insurer will waive all rights of subrogation against the City 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.

ADD:

7-6

THE CONTRACTORS REPRESENTATIVE. To the "GREENBOOK", ADD the following:

1. Both the representative and alternative representative shall be employees of the Contractor and shall not be assigned to a Subcontractor unless otherwise approved by the City in writing.

7-13.4

Contractor Standards and Pledge of Compliance. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. The Contract is subject to City's Municipal Code §22.3004 as amended 10/29/13 by ordinance O-20316.
2. You shall complete a Pledge of Compliance attesting under penalty of perjury that you complied with the requirements of this section.
3. You shall ensure that all Subcontractors complete a Pledge of Compliance attesting under penalty of perjury that they complied with the requirements of this section.
4. You may access the Pledge of Compliance at:

http://www.sandiego.gov/purchasing/pdf/contractor_standards_questionnaire.pdf

5. You shall require in each subcontract that the Subcontractor shall abide by the provisions of the City's Municipal Code §22.3004. A sample provision is as follows:

"Compliance with San Diego Municipal Code §22.3004: The Subcontractor acknowledges that it is familiar with the requirements of San Diego Municipal Code §22.3004 ("Contractor Standards"), and agrees to comply with requirements of that section. The Subcontractor further agrees to complete the Pledge of Compliance, incorporated herein by reference."

ADD:

7-13.8

Equal Pay Ordinance.

1. You shall comply with the Equal Pay Ordinance (EPO) codified in the San Diego Municipal Code (SDMC) in section 22.4801 through 22.4809, unless compliance is not required based on an exception listed in SDMC section 22.4804.
2. You shall require all of your Subcontractors to certify compliance with the EPO in their written subcontracts.
3. You shall post a notice informing your employees of their rights under the EPO in the workplace or job site.

4. By signing this Contract with the City of San Diego, you acknowledge the EPO requirements and pledge ongoing compliance with the requirements of SDMC Division 48, section 22.4801 et seq., throughout the duration of this Contract.

7-20 ELECTRONIC COMMUNICATION. To the "WHITEBOOK", ADD the following:

2. Virtual Project Manager shall be used on this Contract.

7-21.1 General. To the "WHITEBOOK", item 3, DELETE in its entirety and SUBSTITUTE with the following:

3. During the construction phase of projects, the minimum waste management reduction goal is 90% of the inert material (a material not subject to decomposition such as concrete, asphalt, brick, rock, block, dirt, metal, glass, and etc.) and 65% of the remaining project waste. You shall provide appropriate documentation, including a Waste Management Form attached as an appendix, and evidence of recycling and reuse of materials to meet the waste reduction goals specified.

7-22.20 Payment. To the "WHITEBOOK", item 1, ADD the following:

- o) Payment for removal and disposal of asbestos and lead and all associated work described in **Appendices J** and **K** shall be paid as lump sum and shall be included in the Bid Item "Asbestos and Lead Abatement".

SECTION 9 – MEASUREMENT AND PAYMENT

9-3.1 General. To the "WHITEBOOK", ADD the following:

3. The Bid item for "**Tenant Improvement of Flight Service Station (FSS)**" shall include selective demolition and new construction of a single-story administration and service building at an existing FAA services building. Necessary termite mitigation. Structure to consist of woodstud walls, TPO roof, interior partitions, enclosed offices, lobby, meeting rooms, exercise room, training room, equipment rooms, telecom and electrical rooms, dormitories, restrooms, kitchen and dining room. All mechanical (HVAC),plumbing, electrical, interior / exterior lighting, Emergency Standby generator, landscaping, sitework, paving and striping, and a fire suppression system to be incorporated as specified in the Plans, Contract Documents, and Technicals.
4. The Bid item for "**Temporary Facilities**" shall include locating on the site a state approved commercial coach with ramp/stairs and a separate "sprung structure". The state approved commercial coach and state approved ramp/stair shall comply with all applicable accessibility requirements. Contractor is responsible for paving and utility connections, including temporary generator, as specified in Plans, Contract Documents, and Technicals.

5. The Bid item for **“Furniture, Fixtures, and Equipment”** shall include all items for temporary and permanent facilities as specified in Plans, Technicals, and Appendix M – “Furniture, Fixtures, and Equipment (FF&E) List” of the Contract Documents.
6. The Bid item for **“Communications & Utilities”** shall include all SDG&E services, dry utilities connections, AT&T, I.T., WAPs, Station Alerting and any other miscellaneous communications as specified in Plans, Technicals, and Appendix L – “DoIT Network Projects and Requirements” of the Contract Documents.

SECTION 209 – PRESSURE PIPE

209 PRESSURE PIPE. To the “WHITEBOOK”, ADD the following:

2. PVC products, specifically type C900 and C905, as manufactured or distributed by J-M Manufacturing Company or JM Eagle shall not be used on the Contract for pressurized pipe.

SECTION 217 – BEDDING AND BACKFILL MATERIALS

217-2.2 Stones, Boulders, and Broken Concrete. To the “GREENBOOK”, Table 217-2.2, DELETE in its entirety and SUBSTITUTE with the following:

TABLE 217-2.2

Zone	Zone Limits	Maximum Size (greatest dimension)	Backfill Requirements in Addition to 217-2.1
Street or Surface Zone	From ground surface to 12” (300 mm) below pavement subgrade or ground surface	2.5” (63 mm)	As required by the Plans or Special Provisions.
Street or Surface Zone Backfill of Tunnels beneath Concrete Flatwork		Sand	Sand equivalent of not less than 30.
Trench Zone	From 12” (300 mm) below pavement subgrade or ground surface to 12” (300 mm) above top of pipe or box	6” (150 mm)	
Deep Trench Zone (Trenches 3’ (0.9 m) wide or wider)	From 60” (1.5 m) below finished surface to 12” (300 mm) above top of pipe or box	Rocks up to 12” (300 mm) excavated from trench may be placed as backfill	
Pipe Zone	From 12” (300 mm) above top of pipe or box to 6” (150 mm) below bottom of pipe or box exterior	2.5” (63 mm)	Sand equivalent of not less than 30 or a coefficient of permeability greater than 1-½ inches/hour (35 mm per hour).

Zone	Zone Limits	Maximum Size (greatest dimension)	Backfill Requirements in Addition to 217-2.1
			1-½ inches/hour (35 mm per hour).
Overexcavation	Backfill more than 6" (150 mm) below bottom of pipe or box exterior	6" (150 mm)	Sand equivalent of not less than 30 or a coefficient of permeability greater than 1-½ inches/hour (35 mm per hour). Trench backfill slurry (100-E-100) per 201-1 may also be used.

SECTION 304 –METAL FABRICATION AND CONSTRUCTION

304-5 PAYMENT. To the "WHITEBOOK", REVISE section "304-5" to "304-6".

SECTION 306 – OPEN TRENCH CONDUIT CONSTRUCTION

306-3.3.4.1 Non-Friable Asbestos Cement Pipe (ACP). To the "WHITEBOOK", item 2, subsection "i", DELETE in its entirety and SUBSTITUTE with the following:

- i) A minimum of 5 Working Days prior to the transportation of the ACP disposal bins or friable asbestos waste, you shall provide notice to and assist the Resident Engineer in completing the Inspection Work Request Form for the Asbestos, Lead, and Mold Program. The form is located below:

<https://forms.sandiego.gov/f/gS2064>

306-6.5.1 General. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

- 1. For PVC water pipes:
 - a) Bedding material shall:
 - i. Either be sand, crushed aggregate, or native free-draining granular material.
 - ii. 100% of the bedding material shall pass the no. 4 sieve and shall have an expansion when saturated with water of not more than 0.5%.
 - iii. Have a sand equivalent of SE 50. SE 30 or higher may be substituted for SE 50 as bedding material if all of the following requirements are met:
 - The top of the pipe and haunch areas are mechanically compacted by means of tamping, vibrating roller, or other mechanical tamper.

- Equipment is of size and type approved by the Engineer.
 - 90% relative compaction or better is achieved.
- b) When jetting, care shall be exercised to avoid floating of the pipe.
2. PVC sewer pipes shall be bedded in 3/8 inch (9.5 mm) or 1/2 inch (12.5 mm) crushed rock in accordance with 200-1.2, "Crushed Rock and Rock Dust". Crushed rock for PVC sewer pipes may contain recycled Portland Cement Concrete and shall conform to gradation requirements for 3/8 inch or 1/2 inch nominal size as shown in Table 200-1.2.1 (A).
 3. Storm drains and all types of non-PVC sewer mains shall be bedded in 3/4 inch (19 mm) crushed rock in accordance with 200-1.2, "Crushed Rock and Rock Dust". Crushed rock for storm drains may contain recycled Portland Cement Concrete and shall conform to gradation requirements for 3/4 inch nominal size as shown in Table 200-1.2.1 (A). Bedding shall be placed to a depth of 4 inches (101.6 mm) below the outside diameter of the pipe or 1 inch (25.4 mm) below the bell of the pipe, whichever is greater.

306-7.8.2.1 General. To the "WHITEBOOK", item 2, ADD the following:

- a) Specified test pressure for Class 900 CL 305 DR-14 pipe shall be 200 psi.

SECTION 314 – TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

314-4.3.7 Payment. To the "WHITEBOOK", ADD the following:

1. The payment for the replacement of existing traffic striping, pavement markings, and pavement markers shall be included in the Bid item for "Tenant Improvements of Flight Service Station" (Bid Item #2) and shall also include the payment for new installations of traffic striping, pavement markings, and pavement markers.

314-4.4.6 Payment. To the "WHITEBOOK", DELETE in its entirety and SUBSTITUTE with the following:

1. No separate payment shall be made for establishing alignment for stripes and layout Work.
2. The payment for the installation of proposed thermoplastic striping and thermoplastic pavement markings, in accordance to the Plans, shall be included in the Bid item for "Tenant Improvements of Flight Service Station" (Bid Item #2).
3. The payment for the replacement of thermoplastic striping and thermoplastic pavement markings shall be included in the Lump Sum Bid item for "Tenant Improvements of Flight Service Station" (Bid Item #2).

4. The payment for the thermoplastic traffic striping of continental crosswalks shall be included in the Bid item for "Tenant Improvements of Flight Service Station" (Bid Item #2).
5. The payment for the replacement of existing traffic striping, pavement markings, and pavement markers shall be included in the Bid item for "Tenant Improvements of Flight Service Station" (Bid Item #2) and shall also include the payment for new installations of traffic striping, pavement markings, and pavement markers

SECTION 600 - ACCESS

**ADD:
600-1**

GENERAL. To the "WHITEBOOK", item 5, DELETE in its entirety and SUBSTITUTE with the following:

5. If the City's crews are unable to provide the citizens with the mandated services due to your failure to comply with these specifications, you shall collect trash, recyclables, and yard waste on the City's schedule and deliver to the City's designated locations. If you fail to perform this Work, you shall incur additional costs for the City to reschedule pick up of an area.

SECTION 901 - INSTALLATION AND CONNECTION

901-2.5

Payment. To the "WHITEBOOK", item 3, DELETE in its entirety and SUBSTITUTE with the following:

3. Traffic control, saw cutting the trench area, trench caps, and other spot repairs in the vicinity of the disturbed area at each restored connection shall be included in the Bid item for "Tenant Improvements of Flight Service Station".

EQUAL OPPORTUNITY CONTRACTING PROGRAM (EOCP) SECTION A - GENERAL REQUIREMENTS

4.1

Nondiscrimination in Contracting Ordinance. To the "WHITEBOOK", subsection 4.1.1, paragraph (2), sentence (1), DELETE in its entirety and SUBSTITUTE with the following:

You shall not discriminate on the basis of race, gender, gender expression, gender identity, religion, national origin, ethnicity, sexual orientation, age, or disability in the solicitation, selection, hiring, or treatment of subcontractors, vendors, or suppliers.

END OF SUPPLEMENTARY SPECIAL PROVISIONS (SSP)

TECHNICALS

PROJECT MANUAL

including

SPECIFICATIONS

for

City of San Diego

San Diego Fire-Rescue Air Operations Facility
4302 Ponderosa Avenue
San Diego, California 92123

February 21, 2018

Prepared by

Davy Architecture

1053 Tenth Avenue
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Telephone (619) 238-3811

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- 22 1119 DOMESTIC WATER PIPING SPECIALTIES
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- 22 1316 SANITARY WASTE AND VENT PIPING
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PROJECT DIRECTORY

Owner	City of San Diego 525 B Street, Suite 750 San Diego, California 92101
Project Location	4302 Ponderosa Avenue San Diego, California 92123
Architect	Davy Architecture 1053 Tenth Avenue San Diego, California 92101 Attn: Mike Vanderhoof - 619-238-3811 mvanderhoof@davyarchitecture.com
Civil Engineer	Omega Engineering Consultants 4340 Viewridge Avenue, Suite B San Diego, California 92123 Attn: Sean Savage – 858-634-8620 sean@omega-consultants.com
Structural Engineer	GSSI Structural Engineers 3969 First Avenue, Suite 200 San Diego, California 92103 Attn: Omar Gonzales – 619-687-3810
Mechanical, Plumbing Engineer	Walsh Engineering 4711 Viewridge Avenue, Suite 210 San Diego, California 92123 Attn: Mark Hyde – 858-541-0788 mhyde@walsheng.com
Electrical Engineer	NEDC, Inc 3103 Falcon Street, Suite J San Diego, California 92103 Attn: David Nutter – 619-278-0076

END OF DOCUMENT

SECTION 01 4000 - QUALITY REQUIREMENTS

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, other Division 1 Specifications Sections and the City of San Diego "WHITEBOOK" apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Documents requirements.
 - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specify tests, inspections, and related actions do not limit Contractor's quality control procedures that facilitate compliance with the Contract Document requirements.
- C. Related sections include the following:
 - 1. Division 1 section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.

1.3 SUBMITTALS

- A. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Time schedule or time span for tests and inspections.
 - 4. Entity responsible for performing tests and inspections.
 - 5. Requirements for obtaining samples.

1.4 QUALITY ASSURANCE

- A. Testing and inspections required by governing authorities will be performed by an independent testing laboratory selected and employed by the Contractor and approved by the City of San Diego. Qualification of a testing agency or laboratory will be under the jurisdiction of the City. Procedural and acceptance criteria are set forth in California Code of Regulations (CCR) Title 24 Part 1, Administrative Regulations, and Interpretation of Regulations.
- B. Testing and inspection services which are performed shall be in accordance with requirements of CCR Title 12 Part 1, Administrative Regulations, and as specified herein. Testing and inspection services shall verify that work meets the requirements of the Contract Documents.

- C. In general, tests and inspections for structural materials shall include all items enumerated on the Structural Test and Inspections list for this project as prepared and distributed by the Resident Engineer.
- D. Test reports shall be signed by Registered Civil Engineer licensed in the State of California.
- E. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality assurance service to Architect and City's Resident Engineer (RE), with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspector work complies with or deviates from the Contract Documents.
 - 1. Notify Architect, Resident Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 2. Submit a certified written report of each test, inspection, and similar quality control service to Architect and City's Resident Engineer, with copy to Contractor and to authorities having jurisdiction.
 - 3. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Document.
 - 4. Retest and reinspect corrected work.
 - 5. Cooperate with Resident Engineer, Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 6. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 - 7. Do not perform any duties of Contractor.
 - 8. Test or inspection report shall bear the official File Number and Application Number assigned to this project by the City of San Diego.
- F. Testing Laboratory shall distribute one copy of each test and inspection report to each of the following:
 - 1. City's Resident Engineer
 - 2. Inspector
 - 3. Architect
 - 5. Contractor
- G. Test reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operation as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of CCR Title 24 Part 1 Administrative regulations, Part 2 California Building Code, and with the approved specifications. They shall also state definitely whether or not the material or materials tested comply with requirements.
- I. Verification of Test Reports
 - 1. Each testing agency shall submit to the RE a verified report in duplicate covering all of the tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time, and at the completion of the project, covering all tests.
- J. Reporting Test Failures:
 - 1. Immediately upon Testing Laboratory determination of a test failure, the Laboratory will

telephone the results of test to Resident Engineer and Architect. On the same day, Laboratory will send written test results to those named on the above distribution list.

1.5 PAYMENTS

- A. Costs of initial testing and inspection, except as specifically modified herein, or specified otherwise in technical sections, will be paid for by the Contractor. Initial tests and inspections are defined as the first tests and inspections as herein specified.
- B. In the event a test or inspection indicates failure of a material or procedure to meet requirements of Contract Documents, costs for retesting and reinspection will be paid by the Contractor.
- C. Additional tests and inspections not herein specified but requested by Owner or Architect, will be paid for by the Contractor, unless results of such tests and inspections re found to be not in compliance with contract documents.
- D. Costs for additional tests or inspections required because of change in materials being provided or change of source or supply will be paid by the Contractor.
- E. Costs for tests or inspections which are required to correct deficiencies will be paid by the Contractor.
- F. Cost of testing which is required solely for the convenience of Contractor in his scheduling and performance of work will be paid by the District and back charged to the Contractor.
- G. Overtime costs for inspections performed outside the regular workday hours, including weekends and holidays, will be paid for by the Contractor. Such costs include overtime costs for the City's Representative.
- H. Testing Laboratory will separate and identify on the invoices, the costs covering all testing and inspections which are to be back charged to the Contractor as specified above.
 - 1. Testing Laboratory will furnish to District a cost estimate breakdown covering initial tests and inspections required by Contract Documents. Estimate will include number of tests, man hours required for tests, field and plant inspections, travel time, and costs.
- I. Should it be considered necessary or advisable by the District at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the completed work, the Contractor shall, on request, promptly furnish necessary facilities, labor or his subcontractor, he/she shall be responsible for all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of labor and material necessarily involved in the examination and replacement shall be reimbursed to the Contractor.

1.6 QUALITY CONTROL

- A. Contractor Responsibilities:
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services.
 - a. Contractor shall not employ the same entity engaged by District

2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Costs for retesting and reinserting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Services: Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that required control by testing agency.
 6. Security and protection for samples and for testing and inspecting equipment at project site.
 7. Selection of the material required to be tested will be by the laboratory or the District's Representative and not by the Contractor.
- C. Contractor shall notify the Testing Agency a minimum of 3 working days in advance of the manufacture of material to be supplied by them under the Contractor Documents, which must be terms of the Contract be tested, in order that the Agency may arrange for the testing of such material at the source of supply.
1. Material shipped by the Contractor from the source of supply before having satisfactorily passed such testing and inspection or before the receipt of notice from the Owner's Representative that such testing and inspection will not be required, shall not be incorporated in the Project.
- D. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule time for tests, inspections, obtaining samples, and similar activities.
- E. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Architect and testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
 2. Unless otherwise specified, Contractor shall notify Testing laboratory a minimum of 10 working days in advance of all required tests, and a minimum of 2 working days in

advance of all required inspections. Extra laboratory expenses resulting from a failure to notify the Laboratory will be paid by the Owner and back charged to the Contractor.

3. Contractor shall give sufficient advance notice to Testing Laboratory in the event of cancellation or time extension of a scheduled test or inspection. Charges due to insufficient advance notice of cancellations or time extension will be paid for by the Owner and back charged to the Contractor.

1.7 RESIDENT ENGINEER

- A. A Resident Engineer (or inspector) employed by the District in accordance with the requirements of CCR Title 24 Part 1, Administrative Regulations, will be assigned to the work.
- B. The Contractor shall notify the Resident Engineer a minimum of two working days in advance of execution of all work that required inspection.
- C. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Resident Engineer. The Resident Engineer shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to be fully informed respecting the progress and manner of the work and the character of the materials. Inspections of the work shall not relieve the Contractor from any obligation to comply with the Contract requirements.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: on completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Comply with the Contract Documents requirements for Division 1 Section "Cutting and Patching".
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

3.2 TESTS AND INSPECTIONS

- A. Perform tests and inspections for the following in conformance with the current California Building Code, Title 24, Part 2, of the CCR, and Interpretations of Regulations of the California SSS Interpretive Manual.
- B. Excavations and Foundations (Chapter 18A and Appendix J)
 1. Earth fill compaction -1804A
 2. Excavation and fill for foundations 1804A.

C. Concrete (Chapter 19A)

1. Materials

- a. Portland Cement Tests – 1903A.3
- b. Concrete Aggregates - 1903A.5
- c. Reinforcing Bars – 1704A.4.1
- d. Batch Plant Inspection – 1704.4.2
- e. Waiver of Batch Plant Inspection and Tests – 1704A.4.3

2. Concrete Quality

- a. Proportions of Concrete - 1904A, 1905A.1 thru A.6
- b. Strength Tests of Concrete - 1905A.6
- c. Splitting Tensile Strength - 1905A.1.1

3. Concrete Inspection

- a. Job site inspection – 1905A.7
- b. Batch Plant or Weighmaster Inspection – 1705A.3
- c. Reinforcing Bar Welding Inspection – 1705A.2.2.1.2

4. Anchors in Concrete

- a. Drilled in expansion bolts or epoxy type anchors in concrete – 1916A.7
- c. Structural steel (Title 24, Part 2, Chapter 22A)

1. Materials

- a. Structural steel 2205A.1
- b. Cold formed Steel 2210A
- c. Material identification – 2203A.1
- d. High Strength Bolts, Nuts, & Washers – 2213A.1
- e. End Welded Studs - 2213A.2

2. Structural Steel Inspection

- a. Shop Fabrication Inspection – 1704A.2.5
- b. High Strength bolt inspection – 1704A.2.1
- c. Welding Inspection – 1705A.2.2
- d. Nelson Stud Welding – 2213.A.2

D. Miscellaneous Fasteners

- 1. Anchorage test methods as shown on drawings and specified in respective sections.

3.3 EARTHWORK

- A. The Geotechnical Engineer of record or a Geotechnical Engineer selected by the Owner will

provide continuous inspection of fill and will field test fill and earth backfill as placed and compacted, and inspect excavations and subgrade before concrete is placed and provide periodic inspection of open excavations, embankments, and other cuts or vertical surfaces of earth. The Geotechnical Engineer will submit a report indicating that they have observed and tested fills and that in their opinion the fills were placed in accordance with the project specifications. Deliver Report to Resident Engineer and Architect.

- B. Contractor shall remove unsatisfactory material, reroll, adjust moisture, place new material, or in the case of excavations, provide proper protective measures, perform other operations necessary, as directed by the Geotechnical Engineer whose decisions and directions will be considered final.

- D. Soils Test and Inspection Procedure:
 - 1. Allow sufficient time for testing, and evaluation of results before material to be incorporated into the project is needed. The Geotechnical Engineer shall be sole and final judge of suitability of all materials to be imported to the project.
 - 2. Laboratory compaction tests to be used will be in accordance with ASTM D 1557.
 - 3. Field density tests will be made in accordance with ASTM D 1556.
 - 4. Number of test will be determined by Geotechnical Engineer. Materials in question may not be used pending test results.
 - 5. Excavation and embankment inspection procedure. Geotechnical Engineer will visually or otherwise examine such areas for bearing values, cleanliness and suitability.
 - 6. Earthwork Test Reports: In order to avoid misinterpretations by the reviewing agencies, all retest results shall be reported on the same sheet, immediately following the previous failure test to which it is related, retests shall be clearly noted as such.

END OF SECTION 01 4000

SECTION 01 4220

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Applicability and availability of standards referenced or specified in these specifications.

1.1.2 Related Documents: The Conditions of the Contract and other sections of Division 1 apply to this section as fully as if repeated herein.

1.2 APPLICABILITY:

1.2.1 For products or workmanship specified by association, trades, or Federal Standards, comply with requirements of the standard, only to the extent required by the specific reference contained in these specifications.

1.2.2 The issue of the standard that is in effect for this Contract shall be the issue designated by the specific reference to the standard. Where the issue is not designated in the reference, the issue of the standard is the latest issue published as of the Bid date.

1.3 AVAILABILITY:

The standards are referenced in these specifications by acronyms which are listed below with the full name of the sponsoring organization and the address from which copies may be obtained.

- AA Aluminum Association
900 19th Street NW, Suite 300
Washington, DC 20006
202/862-5100
www.aluminum.org

- AABC Associated Air Balance Council
1518 K Street, NW, Suite 503
Washington, DC 20005
202/737-0202
www.aabchq.com

- AAMA American Architectural Manufacturers
Association
1827 Walden Office Sq., Suite 104
Schaumburg, IL 60173-4268
847/303-5664
www.aamanet.org

- AASHTO American Association of State Highway and
Transportation Officials
444 North Capitol Street, Suite 249
Washington, DC 20001
202/624-5800
www.aashto.org
- AATCC American Association of Textile Chemists
and Colorists
P.O. Box 12215
One Davis Drive
Research Triangle Park, NC 27709-2215
919/549-8141
www.aatcc.org
- ACI American Concrete Institute
P.O. Box 9094
Farmington Hills, MI 48333-9094
248/848-3700
www.aci-int.org
- ACPA American Concrete Pipe Association
222 West Las Colinas Blvd., Suite 641
Irving, TX 75039-5423
972/506-7216
www.concrete-pipe.org
- ADC Air Diffusion Council
104 South Michigan Ave., Suite 1500
Chicago, IL 60603
312/201-0101
- AF&PA American Forest and Paper Association
1111 19th St., NW, Suite 800
Washington, DC 20036
800/878-8878
www.afandpa.org
- AGA American Gas Association
400 N. Capitol St. N. W.
Washington, D.C. 20001
202/824-7000
www.aga.com
- AHA American Hardboard Association
1210 W. Northwest Hwy
Palatine, IL 60067-1897
847/934-8800
www.hardboard.org
- AHAM Association of Home Appliance Manufacturers
1111 19th Street NW, #402
Washington, DC 20036
202/872-5955
www.aham.org

ALA American Library Association
50 E. Huron
Chicago, IL 60611
800/545-2433

AI Asphalt Institute
Research Park Drive
P.O. Box 14052
Lexington, KY 40512-4052
606/288-4960
www.asphaltinstitute.org

AIA The American Institute of Architects
1735 New York Avenue, NW
Washington, DC 20006-5292
202/626-7300
www.e-architect.com

AISC American Institute of Steel Construction
One East Wacker Drive, Suite 3100
Chicago, IL 60601-2001
800/644-2400
www.aisc.org

AISI American Iron and Steel Institute
P.O. Box 4321
Chestertown, MD 21690
800/277-3850
www.steel.org

AITC American Institute of Timber Construction
7012 S. Revere Pkwy., Suite 140
Englewood, CO 80112
303/792-9559
www.aitc-glulam.org

ALCA Associated Landscape Contractors of
America
12200 Sunrise Valley Drive, Suite 150
Reston, VA 20191
703/620-6363
www.alca.org

ALI Associated Laboratories, Inc.
P.O. Box 152837
1323 Wall St.
Dallas, TX 75315
214/565-0593

ALSC American Lumber Standards Committee
P.O. Box 210
Germantown, MD 20875
301/972-1700

- AMCA Air Movement and Control Association
International, Inc.
30 W. University Drive
Arlington Heights, IL 60004-1893
847/394-0150
www.amca.org
- ANLA American Nursery and Landscape Association
1250 I Street, NW, Suite 500
Washington, DC 20005-3922
202/789-2900
www.anla.org
- ANSI American National Standards Institute
11 West 42nd Street, 13th Floor
New York, NY 10036-8002
212/642-4900
www.ansi.org
- APA APA-The Engineered Wood Association
2130 Barret Park Dr., Suite 102
Kennesaw, GA 30144-3681
770/427-9371
www.apawood.org
- APA Architectural Precast Association
6710 Winkler Road, Ste. 8
Fort Myers, FL 33919
941/454-6989
www.archprecast.org
- ARI Air Conditioning and Refrigeration Institute
4301 Fairfax Drive, Suite 425
Arlington, VA 22203
703/524-8800
www.ari.org
- ARMA Asphalt Roofing Manufacturers Association
1156-15th Street, NW, Ste. 900
Washington, DC 20005
202/207-0917
www.asphaltroofing.org
- ASA Acoustical Society of America
500 Sunnyside Blvd.
Woodbury, NY 11797
516/576-2360
www.acoustics.org
- ASCE American Society of Civil Engineers-
World Headquarters 703/295-6300
1801 Alexander Bell Drive
Reston, VA 20190-4400
800/548-2723
www.asce.org

- ASHRAE American Society of Heating, Refrigerating and
Air Conditioning Engineers
1791 Tullie Circle, NE
Atlanta, GA 30329-2305
800/527-4723 –or- 404/636-8400
www.ashrae.org
- ASLA American Society of Landscape Architects
4401 Connecticut Ave., NW, 5th Floor
Washington, DC 20008-2369
202/686-2752
www.asla.org
- ASME ASME International
Three Park Avenue
New York, NY 10016-5990
212/591-7722
www.asme.org
- ASPE American Society of Plumbing Engineers
3617 Thousand Oaks Blvd., Suite 210
Westlake, CA 91362-3649
805/495-7120
- ASQC American Society for Quality
611 E. Wisconsin Avenue
Milwaukee, WI 53201-3005
800/248-1946 – or -414/272-8575
www.asq.org
- ASSE American Society of Sanitary Engineers
28901 Clemens Road
Westlake, OH 44145
440/835-3040
www.asse-plumbing.org
- ASTM American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
610/832-9500
www.astm.org
- AWCI Association of the Wall and Ceiling
Industries--International
307 E. Annandale Road, Suite 200
Falls Church, VA 22042-2433
703/534-8300
www.awci.org
- AWI Architectural Woodwork Institute
1952 Isaac Newton Square
Reston, VA 20190
703/733-0600
www.awinet.org

- AWPA American Wood Protection Association
P.O. Box 361784
Birmingham, AL 35236-1784
205/733-4077
www.awpa.com
- AWS American Welding Society
550 NW LeJeune Road
Miami, FL 33126
800/443-9373 305/443-9353
www.amweld.org
- AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235
800/926-7337 –or - 303/794-7711
www.awwa.org
- BHMA Builders' Hardware Manufacturers Association
355 Lexington Avenue, 17th Floor
New York, NY 10017-6603
212/297-2100
- BIA Brick Institute of America
11490 Commerce Park Drive
Reston, VA 22091-1525
703/620-0010
www.bia.org
- CE Corps of Engineers
(U.S. Department of the Army)
20 Massachusetts Avenue, NW
Washington, DC 20314
202/761-0660
CRD standards are available from:
U.S. Army Corps of Engineers
Waterways Experiment Station
Technical Report Distribution Section
Services Branch, TIC
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
601/634-2696
- CBM Certified Ballast Manufacturers Association
1422 Euclid Avenue, Suite 402
Cleveland, OH 44115-2094
216/241-0711
- CCC Carpet Cushion Council
P.O. Box 546
Riverside, CT 06878-0546
203/637-1312
www.carpetcushion.org

- CDA Copper Development Association
260 Madison Avenue, 16th Floor
New York, NY 10016-2401
800/232-3282 – or - 212/251-7200
www.copper.org
- CGA Compressed Gas Association
1725 Jefferson Davis Hwy, Suite 1004
Arlington, VA 22202-4102
703/412-0900
www.cganet.com
- CISCA Ceilings & Interior Systems Construction
Association
1500 Lincoln Hwy, Suite 202
St. Charles, IL 60174
202/275-7703
www.cisca.org
- CISPI Cast Iron Soil Pipe Institute
5959 Shallowford Road, Suite 419
Chattanooga, TN 37421
423/892-0137
www.cispi.org
- CLFMI Chain Link Fence Manufacturers Institute
10015 Old Columbia Rd., #B-215
Columbia, MD 21046
301/596-2583
www.chainlinkinfo.org
- CPSC Consumer Product Safety Commission
East West Towers
4330 East-West Hwy.
Bethesda, MD 20814
800/638-2772
- CPPA Corrugated Polyethylene Pipe Association
432 N. Superior Street
Toledo, OH 43604
800/510-2772 – or - 419/241-2221
- CRA California Redwood Association
405 Enfrente Drive, Suite 200
Novato, CA 94949
888/225-7339 – or - 415/382-0662
www.calredwood.org
- CRI Carpet and Rug Institute
310 S. Holiday Avenue
Dalton, GA 30722-2048
800/882-8846 – or - 706/278-0232
www.carpet-rug.com

- CRSI Concrete Reinforcing Steel Institute
933 N. Plum Grove Road
Schaumburg, IL 60173-4758
847/517-1200
www.crsi.org
- CSSB Cedar Shake and Shingle Bureau
515 116th Avenue, NE, Suite 275
Bellevue, WA 98004-5294
206/453-1323
www.cedarbureau.org
- CTI Ceramic Tile Institute of America
12061 W. Jefferson Blvd.
Culver City, CA 90230-6219
310/574-7800
www.ceramic-tile.com
- DHI Door and Hardware Institute
14170 Newbrook Drive
Chantilly, VA 20151-2223
703/222-2010
www.dhi.org
- DIPRA Ductile Iron Pipe Research Association
245 Riverchase Pkwy East, Suite O
Birmingham, AL 35244
205/402-8700
www.dipra.org
- DOC Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
703/605-6000
- DOT Department of Transportation
400 Seventh Street, SW
Washington, DC 20590
202/366-4000
- EIMA EIFS Industry Members Association
402 N. Fourth Street, Suite 102
Yakima, WA 98901-2470
800/294-3462 – or - 509/457-3500
www.eifsfacts.com
- EJMA Expansion Joint Manufacturers Association
25 N. Broadway
Tarrytown, NY 10591-3201
914/332-0040
www.ejma.org

EPA	Environmental Protection Agency 401 M Street, SW Washington, DC 20460 800/490-9198 www.epa.gov
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322-1234 248/661-5015 www.fcica.com
FM	Factory Mutual 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062-9102 617/255-4681 www.fmglobal.com
FCCHR	Foundation for Cross-Connection Control and Hydraulic Research University of Southern California KAP-200 University Park MC-2531 Los Angeles, CA 90089-25319 213/740-2032
FS	Federal Standards (Available from GSA) 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 202/619-8925
FTI	Facing Tile Institute % Stark Ceramics P.O. Box 8880 Canton, OH 44711 330/488-1211
GA	Gypsum Association 810 First Street NE, Suite 510 Washington, DC 20002 202/289-5440 www.gypsum.org
GANNA	Glass Association of North America 3310 SW Harrison Street Topeka, KS 66611-2279 913/266-7013 www.glasswebsite.com/ganna
HMA	Hardwood Manufacturers Association 400 Penn Center Blvd., Suite 530 Pittsburgh, PA 15235-5605 800/373-9663 – or - 412/828-0770 www.hardwood.org

- HPVA Hardwood Plywood and Veneer Association
1825 Michael Farraday Drive
P.O. Box 2789
Reston, VA 20195
703/435-2900
www.hpva.org
- IEEE Institute of Electrical and Electronic Engineers
445 Hoes Lane
Piscataway, NJ 08855-1331
800/678-4333 – or - 212/705-7900
www.standards.ieee.org
- IESNA Illuminating Engineering Society of
North America
120 Wall Street, 17th Floor
New York, NY 10005-4001
212/248-5000
www.iesna.org
- ILI Indiana Limestone Institute of America
Stone City Bank Building, Suite 400
Bedford, IN 47421
812/275-4426
www.iliai.com
- ITS Intertek Testing Services
P.O. Box 2040
3933 US Route 11
Cortland, NY 13045-7902
800/345-3851 – or - 607/753-6711
www.itsglobal.com
- KCMA Kitchen Cabinet Manufacturers Association
1899 Preston White Drive
Reston, VA 22091-4326
703/264-1690
www.kcma.org
- LMA Laminating Materials Association
116 Lawrence Street
Hillsdale, NJ 07642-2730
201/664-2700
www.lma.org
- MBMA Metal Building Manufacturer's Association
1300 Sumner Avenue
Cleveland, OH 44115-2851
216/241-7333
www.mbma.org

- MCAA Mechanical Contractors Association
of America
1385 Piccard Drive
Rockville, MD 20850-4329
301/869-5800
www.mcaa.org
- MFMA Maple Flooring Manufacturers Association
60 Revere Drive, Suite 500
Northbrook, IL 60062
847/480-9138
www.maplefloor.org
- MIA Marble Institute of America
33505 State Street
Farmington, MI 48335
810/476-5558
www.marble-institute.com
- MIA Masonry Institute of America
2550 Beverly Blvd.
Los Angeles, CA 90057
213/388-0427
www.masonryinstitute.org
- ML/SFA Metal Lath/Steel Framing Association
(A Division of the NAAMM)
8 South Michigan Avenue, Suite 1000
Chicago, IL 60603
312/456-5590
- MSS Manufacturers Standardization Society for the
Valve and Fittings Industry
127 Park Street, NE
Vienna, VA 22180-4602
703/281-6613
www.mss-hq.com
- NAA National Arborist Association
P.O. Box 1094
Amherst, NH 03031-1094
800/733-2622 – or - 603/673-3311
www.natlarb.com
- NAAMM National Association of Architectural
Metal Manufacturers
8 South Michigan Avenue, Suite 1000
Chicago, IL 60603
312/332-0405
www.naamm.org

- NAIMA North American Insulation Manufacturers Association
44 Canal Center Plaza, Suite 310
Alexandria, VA 22314
703/684-0084
www.naima.org
- NAPA National Asphalt Pavement Association
NAPA Building
5100 Forbes Blvd.
Lanham, MD 20706-4413
301/731-4748
- NBGQA National Building Granite Quarries Association
1220 " L " Street, NW #100-167
Washington, DC 20005
800/558-2848
www.nbgqa.com
- NCMA National Concrete Masonry Association
2302 Horse Pen Road
Herndon, VA 20171-3499
703/713-1900
www.ncma.org
- NCPI National Clay Pipe Institute
P.O. Box 759
253-80 Center Street
Lake Geneva, WI 53147
414/248-9094
www.ncpi.org
- NCRPM National Council on Radiation Protection and Measurements
7910 Woodmont Ave., Suite 800
Bethesda, MD 20814-3095
800/229-2652 – or - 301/657-2652
www.ncrp.com
- NCSPA National Corrugated Steel Pipe Association
1255 23rd Street, NW, Suite 850
Washington, DC 20037
202/452-1700
www.ncspa.org
- NEBB National Environmental Balancing Bureau
8575 Grovemont Circle
Gaithersburg, MD 20877-4121
301/977-3698
www.nebb.org

- NECA National Electrical Contractors Association
3 Bethesda Metro Center, Suite 1100
Bethesda, MD 20814-5372
301/657-3110
www.necanet.org
- NEI National Elevator Industry
185 Bridge Plaza North, Suite 310
Fort Lee, NJ 07024
201/944-3211
- NEMA National Electrical Manufacturers' Association
1300 N. 17th Street, Suite 1847
Rosslyn, VA 22209
703/841-3200
www.nema.org
- NFPA National Fire Protection Association
One Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
800/344-3555 – or - 617/770-3000
www.nfpa.org
- NHLA National Hardwood Lumber Association
P.O. Box 34518
Memphis, TN 38184-0518
901/377-1818
www.natlhardwood.org
- NIST National Institute of Standards and Technology
100 Bureau Drive – Stop 1070
Gaithersburg, MD 20899-1070
301/975-6478
www.nist.gov
- NIA National Insulation Association
99 Canal Center Plaza, Suite 222
Alexandria, VA 22314
703/683-6422
www.insulation.org
- NOFMA National Oak Flooring Manufacturers Association
P.O. Box 3009
Memphis, TN 38173-0009
901/526-5016
www.nofma.org
- NPA National Particleboard Association
18928 Premiere Court
Gaithersburg, MD 20879-1569
301/670-0604
www.pbmdf.com

- NPCA National Paint and Coatings Association
1500 Rhode Island Avenue, NW
Washington, DC 20005-5597
202/462-6272
www.paint.org
- NRCA National Roofing Contractors Association
P.O. Box 809261
Chicago, IL 60680-9261
800/323-9545
www.roofonline.org
- NRMCA National Ready Mixed Concrete Association
900 Spring Street
Silver Spring, MD 20910
301/587-1400
www.nrmca.org
- NSA National Stone, Sand and Gravel Association
2101 Wilson Blvd.
Arlington, VA 22201
800/342-1415 – or - 703/525-8788
www.nssga.org
- NSF NSF International
P.O. Box 130140
Ann Arbor, MI 48113-0140
734/769-8010
www.nsf.org
- NSSEA National School Supply and Equipment
Association
8300 Colesville Road, Suite 250
Silver Spring, MD 20910
800/395-5550 – or - 301/495-0240
www.nssea.org
- NTMA National Terrazzo and Mosaic Association
3166 Des Plaines Avenue, Suite 121
Des Plaines, IL 60018
800/323-9736 – or - 708/635-7744
www.ntma.com
- NUSIG National Uniform Seismic Installation Guidelines
12 Lahoma Court
Alamo, CA 94526
510/946-0135
- NWWDA The Window and Door Manufacturer's Door Association
1400 East Touhy Ave., Suite 470
Des Plaines, IL 60018
800/223-2301 – or - 847/299-5200
www.wdma.org

- OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
200 Constitution Ave., NW
Washington, DC 20210
202/219-8148
- OSHPD Office of Statewide Health Planning and Development
Gregory Bateson State Office Building
1600 Ninth Street
Sacramento, CA 95814
916/654-1606
- PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077-1083
847/966-6200
www.portcement.org
- PCI Precast/Prestressed Concrete Institute
175 W. Jackson Blvd.
Chicago, IL 60604
312/786-0300
www.pci.org
- PDCA Painting and Decorating Contractors of America
3913 Old Lee Hwy, Suite 33-B
Fairfax, VA 22030
800/332-7322 – or - 703/359-0826
www.pdca.com
- PDI Plumbing and Drainage Institute
45 Bristol Drive
South Easton, MA 02375
800/589-8956 – or - 508/230-3516
www.pdionline.org
- PEI Porcelain Enamel Institute
4004 Hillsboro Pike, Suite 224-B
Nashville, TN 37215
615/385-5357
www.porcelainenamel.com
- RFCI Resilient Floor Covering Institute
401 E. Jefferson #102
Rockville, MD 20850
301/340-8580
www.rfci.com
- RIS Redwood Inspection Service
c/o California Redwood Association
405 Enfrente Drive, Suite 200
Novato, CA 94949-7206
415/382-0662
www.calredwood.org

- SDI Steel Deck Institute
P.O. Box 25
Fox River Grove, IL 60012
847/462-1930
www.sdi.org
- SDI Steel Door Institute
30200 Detroit Road
Cleveland, OH 44145-1967
440/899-0010
www.steeldoor.org
- SIGMA Sealed Insulating Glass Manufacturers
Association
401 N. Michigan Avenue
Chicago, IL 60611-4267
312/644-6610
- SJI Steel Joist Institute
3127 10th Avenue, North Ext.
Myrtle Beach, SC 29577-6760
843/626-1995
www.steeljoist.org
- SMA Stucco Manufacturers Association
14006 Ventura Blvd.
Sherman Oaks, CA 91403
213/789-8733
- SMACNA Sheet Metal and Air Conditioning Contractors
National Association, Inc.
4201 Lafayette Center Drive
Chantilly, VA 20151-1209
703/803-2980
www.smacna.org
- SPI Society of the Plastics Industry, Inc.
Spray Polyurethane Division
1801 K Street, NW, Suite 600K
Washington, DC 20006
800/951-2001 – or - 202/974-5200
www.socplas.org
- SPIB Southern Pine Inspection Bureau
4709 Scenic Highway
Pensacola, FL 32504-9094
850/434-2611
www.spib.org
- SPRI SPRI
(Formerly: Single Ply Roofing Institute)
200 Reservoir Street Suite 309A
Needham, MA 02494
781/444-0242
www.spri.org

SSPC The Society for Protective Coatings
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4656
412/281-2331
www.sspc.org

SWI Steel Window Institute
c/o Thomas Associates, Inc.
1300 Sumner Avenue
Cleveland, OH 44115-2851
216/241-7333
www.steelwindows.com

TCA Tile Council of America
100 Clemson Research Blvd.
Anderson, SC 29625
864/646-8453
www.tileusa.com

TPI Truss Plate Institute
583 D'Onofrio Drive, Suite 200
Madison, WI 53719
608/833-5900

TPI Turfgrass Producers International
1855-A Hicks Road
Rolling Meadows, IL 60008
800/405-8873 – or - 847/705-9898
www.turfgrasssod.org

UL Underwriters Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062
800/704-4050 – or - 847/272-8800
www.ul.com

UNI Uni-Bell PVC Pipe Association
2655 Villa Creek Drive, Suite 155
Dallas, TX 75234
972/243-3902
www.uni-bell.org

USDA U.S. Department of Agriculture
14th St. and Independence Ave., SW
Washington, DC 20250
202/720-8732

USPS U.S. Postal Service
475 L'Enfant Plaza, SW
Washington, DC 20260-0010
202/268-2000

WA Wallcoverings Association
401 N. Michigan Avenue
Chicago, IL 60611-4267
312/644-6610
www.wallcoverings.org

WCLIB West Coast Lumber Inspection Bureau
P.O. Box 23145
Portland, OR 97281-3145
503/639-0651
www.wclib.org

WCMA Window Covering Manufacturers Association
355 Lexington Ave., 17th Floor
New York, NY 10017-6603
212/661-4261

WI Woodwork Institute
P.O. Box 980247
West Sacramento, CA 95798-0247
916/372-9943
www.woodworkinstitute.com

WLPDIA Western Lath/Plaster/Drywall Industries
Association
8635 Navajo Road
San Diego, CA 92119
619/466-9070

WMMPA Wood Moulding & Millwork Producers
Association
507 First Street
Woodland, CA 95695
800/550-7889 – or - 916/661-9591
www.wmmpa.com

WRI Wire Reinforcement Institute
P. O. Box 450
Findlay, OH 45839-0450
419/425-9473
www.wirereinforcementinstitute.org

WWPA Western Wood Products Association
Yeon Building
522 S.W. 5th Avenue, #500
Portland, OR 97204-2122
503/224-3934
www.wwpa.org

END OF SECTION

DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Alteration work consisting of necessary demolition and removal of existing work and installation of new work as indicated and specified in applicable technical sections of the Specifications.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 ALTERATIONS:

1.2.1 Verification of Existing Conditions:

.1 Verify, at the site, conditions affecting the work. Obtain accurate field dimensions of related areas, spaces, openings, levels, and items of adjacent work. Before commencing work, report to the Architect/Designer in writing, discrepancies between the drawings and specifications and the actual field conditions. Commencement of work shall constitute acceptance of all adjacent conditions affecting the work of the section involved.

.2 Drawings show the existing conditions as they are believed to exist. Examine the existing conditions, alter the existing building as indicated, complete, and make required connections between existing and new. Protect existing utilities and structures.

1.2.2 Portions of existing structure where existing work is to be demolished or removed, and where new work is to be done, connections made, materials handled or equipment moved and relocated, shall be temporarily protected. Temporary protection shall be such that interior of existing structure will at all times be protected from dust and weather inclemency. Provide suitable temporary dust proof barrier partitions with hinged doors in existing structure where and as directed and approved by the Architect/Designer. Protect temporary openings in exterior walls by temporary weatherproof plywood closures. The Contractor will be held responsible for damage to existing structure and contents by reason of insufficiency of such protection.

1.2.3 Where alterations occur, or new and old work join, immediate adjacent surfaces, or so much thereof as is required by involved conditions, shall be cut, removed, patched, repaired or refinished and left in as good condition as existed before commencing work. Materials and workmanship employed in alterations involving new construction, unless otherwise indicated or specified, shall conform to that of original work.

.1 Where existing materials to remain interfere with installation of new work, remove existing materials. After installation of new work is complete, or in conjunction with installation of new work as applicable, reinstall existing materials, patch and refinish, or provide new to match existing.

1.2.4 Relocate certain materials and equipment as indicated or specified. Refinish certain existing surfaces as specified in applicable technical sections. Repair and refinish relocated materials and equipment as necessary to leave finished work in good condition.

1.2.5 Salvaged materials occurring from work wrecked or removed shall become property of the Contractor (unless otherwise noted in the Specifications or Drawings to remain property of the Owner) and shall be removed by him from project site. Salvaged material specified or noted on Drawings to be retained by the Owner shall be protected, stored where directed. Construction equipment and mechanical and electrical equipment remaining the property of the Owner shall be carefully removed and stored on project site where directed, except that such items indicated or specified to remain or be relocated shall be set and connected in indicated location.

1.2.6 Before commencing alteration, removal and demolition work, prepare and submit for review by the Architect/Designer and Owner, a schedule showing commencement, order and completion dates of various parts of the work.

1.2.7 Before starting work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to existing buildings, give 2 working days notice to the Architect/Designer and Owner and obtain their approval in writing before proceeding with this phase of the work.

1.3 REGULATORY REQUIREMENTS:

Demolition work shall conform to the California Fire Code, Article 87, "Fire Safety During Construction, Alteration or Demolition of a Building".

1.4 SUBMITTALS:

1.4.1 Schedule: Submit schedule indicating proposed methods and sequence of operations for demolition work for remodeling. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

.1 Provide detailed sequence of demolition and removal operations to ensure uninterrupted progress of Owner's on-site operations.

1.4.2 Submittal procedures and quantities are specified in Division 1.

1.5 IMPACT ON OWNER'S OPERATIONS:

1.5.1 If and when it should be necessary for the Contractor to impact the day-to-day operations of Owner's functions in order to pursue the work, the Contractor shall furnish 3 working days notice to the Owner and coordinate the means and timing to avoid, minimize, or circumvent such impacts. The Owner reserves the right to assess and anticipate such impacts and the right to stop or postpone the work until a mutually satisfactory time and means can be agreed upon. Costs incurred due to delays caused by such impacts on Owner's functions will be negotiated at the time of the occurrence of such delay. Typical impacts shall include, but not be limited to, the following:

.1 Interruption of utility service serving the existing buildings, areas, or functions.

.2 Blockage of or inhibiting access to existing entry, exit, dock, delivery or pickup point, driveway, fire hydrant. Take care to maintain access for delivery of supplies, entry and egress of visitors and employees.

.3 Noise, dust, dirt, water, fumes or other objectionable, hazardous, or disruptive conditions.

.4 Interruption of heating, air conditioning, and ventilation systems.

.5 Interruption of internal systems such as gas supplies, communications, fire sprinklers, fire alarms.

1.6 PROJECT CONDITIONS:

1.6.1 Occupancy: The Owner will be continuously occupying buildings adjacent to areas of demolition operations. Conduct demolition operations in a manner that will minimize need for disruption of Owner's normal operations. Provide minimum of 3 working days advance notice to Owner of demolition activities which will severely impact Owner's operations.

1.6.2 Condition of Structure: The information indicated represents only the opinion of the Owner as to the character of the materials to be encountered and their locations. The Owner assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the Drawings or the interpretation thereof, and there is no warranty or guarantee, either expressed or implied, that the conditions and locations indicated are representative of those existing throughout the existing structures or that unforeseen developments may not occur.

1.6.3 Disconnection of Services: Notify Owner and authorities owning or controlling wires, conduits, pipes, and other services affected by demolition or remodeling a minimum of 3 working days or as required by company, utility, or local authority having jurisdiction before commencing operations.

.1 Disconnect and cap pipes and services as required by company, utility, or local authority having jurisdiction, and as required for demolition Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION:

3.1.1 The drawings show general information only. Examine the site to determine the exact existing conditions and character and extent of the Work to be performed and operations required.

3.1.2 Verify that spaces to remain unaltered adjacent to areas of demolition, alteration, or cutting are completely secured and rendered dustproof before beginning such work.

3.2 PREPARATION:

3.2.1 Provide barricades, and maintenance and supervision thereof, in accordance with applicable Federal, State and local Codes and their respective requirements, or as may be directed from time to time. Install temporary barricades, enclosures and protections before demolition work is started.

3.2.2 Protection from Weather: Protect the interior of the existing building from damage by weather at all times during demolition and remodeling operations.

3.3 GENERAL DEMOLITION REQUIREMENTS:

3.3.1 Remove existing work and items which are required to be removed in such manner that minimum damage and disturbance is caused to adjacent and connection work scheduled to remain. Repair or replace, at the discretion of the Architect, existing work scheduled to remain which is damaged by these operations.

3.3.2 Include preparation of existing areas to receive new materials and removal of materials and equipment to alter or repair the existing building as indicated and as specified.

3.3.3 Perform demolition exercising proper care to prevent injury to the public, workmen and adjoining property.

3.3.4 Perform the removal, cutting, drilling of existing work with extreme care, and use small tools in order not to jeopardize the structural integrity of the building.

3.3.5 Rebuild existing work which has to be removed to allow the installation of new work as required by the Architect.

3.3.6 Remove, protect and reinstall existing items as indicated. Replace materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused, with equal quality material.

3.4 DEMOLITION RESTRICTIONS:

3.4.1 No blasting will be permitted.

3.4.2 Burning of rubbish at the site will not be permitted.

3.4.3 Do not operate air compressors inside of existing buildings.

3.4.4 Drilling or cutting of columns, beams, joists, girders, or other structural supporting elements will not be permitted, unless specifically approved by the Architect.

3.4.5 Cover openings temporarily when not in use and patch as soon as work is installed.

3.5 REMOVED AND SALVAGED ITEMS:

3.5.1 Clean salvaged items.

3.5.2 Pack or crate items after cleaning, identify contents of containers.

3.5.3 Store items in a secure area until delivery to Owner.

3.5.4 Transport items to Owner's storage area {on-site} {off-site} {designated by Owner} {indicated on Drawings}.

3.5.5 Protect items from damage during transport and storage.

3.6 REMOVED AND REINSTALLED ITEMS: Comply with the following:

3.6.1 Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.

3.6.2 Pack or crate items after cleaning and repairing. Identify contents of containers.

3.6.3 Protect items from damage during transport and storage.

3.6.4 Reinstall items in location indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.7 EXISTING ITEMS TO REMAIN:

3.7.1 Protection construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition {and cleaned} and reinstalled in their original locations after selective demolition operations are complete.

3.8 SPECIFIC DEMOLITION REQUIREMENTS:

3.8.1 Interior Slabs On Grade: Use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.

3.8.2 Concrete and Masonry: Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools. Saw concrete along straight lines to a depth of not less than 1-1/2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete or masonry provided that the broken area is concealed in the finished work, and the remaining concrete or masonry is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete or masonry.

3.8.3 Anchorages: Remove anchorages to at least 1/2-inch below the surface of concrete or masonry and patch depressions to provide a flush surface. Where surface will be concealed in the finished work, anchors may be cut flush with the surface.

3.8.4 Remove existing flooring and base completely, including adhesives, edging strips, and accessories within area to be remodeled. Clean existing concrete slab ready to install new flooring materials.

3.8.5 Doors and Hardware and Windows: Remove existing doors and windows where indicated, and infill.

3.8.6 Toilet Partitions: Remove toilet partitions and accessories.

3.8.7 Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to Section 07 51 00 Built-Up Bituminous Roofing for new roofing requirements.

3.8.8 Air-Conditioning Equipment: Remove equipment without releasing refrigerant. Remove and store refrigerant according to 40 CFR 82 and regulations of authorities having jurisdiction. Rooftop air conditioning units and curbs.

3.8.9 Casework: Remove existing casework as indicated on Drawings, repair floor as required.

3.8.10 Building Components: Remove plumbing fixtures and associated plumbing lines. Electrical panels and equipment. Remove and demolish floor drain, and mop sink. Remove

drinking fountain, roof access ladder, draftstop system, cable tray, antenna mounts, scupper and downspouts, conduit, raised computer floor assembly.

3.8.11 Appliances: Existing appliances will be removed by Owner prior to construction work.

3.9 SALVAGED MATERIALS AND ITEMS:

3.9.1 Do not reuse in this project, materials and items removed from existing site or buildings, except with specific written approval by the Architect in each case, unless such removed material or item is specifically indicated or specified to be reused.

3.9.2 Remove materials and equipment indicated to be salvaged for reinstallation and store to prevent damage, and reinstall as the work progresses. Do not reuse in this project, other materials and equipment removed from existing site or building, except with specific written approval by the Architect in each case.

3.9.3 Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance remain the property of the Owner. Notify Owner if such items are encountered and obtain acceptance regarding method of removal and salvage from Owner.

3.9.4 Dismantled materials and items to be reused shall be in good condition without objectionable cracks, chips, splits, checks, dents, scratches, or other defects. Operating items shall operate properly.

3.10 ALTERATIONS, PATCHING AND REPAIRS:

3.10.1 Patch areas requiring patching, including damage caused by removing, relocating, or adding fixtures and equipment, damages caused by demolition at adjacent materials.

3.10.2 Existing permanent walls which remain shall have smooth regular surfaces with no visible marks from previous abutting construction.

3.11 DISPOSAL OF DEMOLISHED MATERIALS:

3.11.1 Do not stockpile debris in the existing building, without the approval of the Architect. Remove debris as it accumulates from removal operations to a legal disposal area.

3.11.2 If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.

3.12 NOISE ABATEMENT AND DUST POLLUTION:

3.12.1 Noise Abatement: Limit noise to a reasonable level as related to specific items of equipment used and their hours of use. This does not preclude use of mechanical equipment, i.e. jack hammers, powder-driven fasteners.

3.12.2 Dust Pollution: During demolition take precautions to moderate the intensity of blowing dust and dirt.

END OF SECTION

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Structural steel work complete, including architecturally exposed structural steel (AESS) work.

1.1.2 Related Documents:

.1 Miscellaneous steel fabrications not forming a part of the structural framing system are specified in Section 05 5000.

.2 The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 DEFINITIONS:

1.2.1 Structural Steel Work: That work defined in the AISC "Manual of Practice".

1.2.2 Architecturally Exposed Structural Steel (AESS): Structural steel members that are exposed to view after interior and exterior building enclosures have been installed.

1.3 REFERENCES:

The editions of specifications and standards referenced herein, published by the following organizations, apply to the construction only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

- American Institute of Steel Construction (AISC)
- American Society for Testing and Materials (ASTM)
- American Welding Society (AWS)
- Steel Structures Painting Council (SSPC)
- Research Council on Riveted and Bolted Joints (RCRBJ)

1.4 SUBMITTALS:

1.4.1 Shop Drawings: Submit shop and erection drawings for review. Review of drawings will cover only the general scheme, design, and character of the details, but not the checking of dimensions nor will such review relieve the Contractor from responsibility for executing the construction in accordance with the contract documents.

.1 Field Measurements: Before starting construction or proceeding with shop and erection drawings, verify measurements, lines, grades, elevations, locations and details of existing field conditions and be responsible for correctness, conformity, accuracy and execution of structural steel construction to conform to actual conditions.

.2 Detailing: Detail in conformance with the AISC Manual "Structural Steel Detailing", except where otherwise indicated.

.3 Field Connections: Clearly show field connections on the erection drawings with complete details as required so that the connections can be made without reference to the design drawings.

.4 Provide setting drawings, templates, and directions for installation of anchor bolt and other anchorages to be installed under other sections.

1.4.2 Product Data:

.1 Submit manufacturer's certification for bolts, nuts, washers, filler material for welding, primer and non-shrink grout.

.2 Submit mill test certificates for mill order steel which can be identified readily by means of heat or melt numbers marked at the mill. Such steel need not be tested as specified in Division 1.

1.4.3 Submittal procedures and quantities are specified in Division 1.

1.5 QUALITY ASSURANCE:

1.5.1 Qualification of Welding: Qualify welding procedures and welding operators in accordance with the latest edition of AWS D1.1. Provide certifications that welders to be employed have satisfactorily passed AWS qualification tests. If recertification of welders is required, retesting will be the Contractor's responsibility.

1.5.2 Regulatory Requirements: Except as modified by the requirements indicated or specified herein, structural steel construction shall conform to the California Building Code (CBC), Chapter 22A - Steel.

1.6 DELIVERY, STORAGE, AND HANDLING:

Deliver material in time to insure uninterrupted progress of the construction. Store materials in a manner to preclude damage and permit ready access for inspection and identification of each shipment. Store steel materials, either plain or fabricated, above the ground upon platforms, pallets, skids, or other supports. Keep materials free from dirt, grease, and other foreign matter, and protect from corrosion. Material showing evidence of damage will be rejected; immediately remove from the site.

PART 2 - PRODUCTS

2.1 GENERAL:

Use only new and undamaged materials. Steel which in the opinion of the Architect is badly corroded or physically damaged shall not be incorporated in the construction.

2.2 MATERIALS:

2.2.1 Structural Steel:

.1 Structural Steel, Shapes, Bars and Plates: ASTM A 36 or ASTM 992.

.2 Structural Tubes: ASTM A 500, Grade B or ASTM A 501.

.3 Structural Pipe Members: ASTM A 53, Type E or S, Grade B, with maximum sulfur content of 0.05 percent.

.4 Additional Requirements for Architecturally Exposed Structural Steel (AESS): The cross sectional configuration of abutting members shall match within a tolerance of 1/16 inch. The as fabricated straightness tolerances for members as a whole shall be one half the standard camber and sweep tolerances specified in ASTM A 6. Materials shall be smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of primers.

2.2.2 High Strength Bolts: ASTM A 325.

2.2.3 Common Bolts and Nuts: ASTM A 307. Provide either hexagonal or square heads and nuts except use only hexagonal units for exposed connections.

2.2.4 Filler Metal for Welding: Meet the requirements of the latest edition of AWS D1.1. Electrodes shall be as recommended by their manufacturers for the position and other conditions of actual use. Electrodes shall be E70 series.

2.2.5 Anchor Bolts, Pins and Rods: ASTM A 307, A 36, or A 283, Grade D.

2.2.6 Primer:

.1 Exterior AESS: Zinc-rich epoxy primer. Acceptable products or equal:

Carboline Co.; No. D658
The Sherwin Williams Co.; Zinc Clad 3
Tnemec Co., Inc.; Tneme-Zinc 90-93

.2 Interior AESS and Concealed Structural Steel: Fast curing, lead and chromate free, modified alkyd primer. Acceptable products or equal:

Carboline Co.; No. GP-20 or GP-818
Rust-O-Leum Corp.; No. 678 or 7669
The Sherwin Williams Co.; No. B50 N 2 or B50N Z 6
Tnemec Co., Inc.; 10-99 or P10-99

2.2.7 Galvanizing: ASTM A 123.

2.2.8 Galvanizing Repair Compound: High zinc dust content galvanizing repair paint conforming to ASTM A 780 or hot applied zinc rich material. Acceptable products or equal:

American Solder & Flux; Drygalv
Kenco Div.; Galvicon
Metalloy Products Co.; Galvalloy

2.2.9 Metallic, Nonshrink Grout: For grout in concealed locations use premixed factory packaged, ferrous aggregate, grouting compound meeting the requirements of ASTM C 1107. Acceptable products or equal:

Gifford-Hill & Co., Inc.; Supreme Plus
Master Builders; Embeco 636
Sonneborn Building Products; Ferrolith G-DS

2.2.10 Nonmetallic, Nonshrink Grout: For grout in exposed to view locations use premixed, nonmetallic, non-corrosive, non-staining grouting compound containing silica sands, portland cement, shrinkage compensating agents and water reducing agents, meeting the requirements of ASTM C 1107. Acceptable products or equal:

Gifford Hill & Co., Inc.; Supreme
Master Builders; Masterflow 713
The Upco Company; Upcon Nonshrink

2.3 FABRICATION:

2.3.1 General: Fabricate and assemble materials in the shop to the greatest extent possible. Shearing, flame cutting, and chipping shall be done carefully and accurately. Coordinate connection details to concrete. Verify lines, levels, and dimensions, where possible, just before commencing fabrication of connection details. Correct construction that does not fit. Schedule and coordinate construction under this section with that specified elsewhere. When not otherwise indicated or specified, comply with applicable requirements of AISC "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings".

2.3.2 Exposed Steel Work: Where steel surfaces are exposed to view in the finished construction, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding or by welding and grinding, before cleaning, treating and application of surface finishes.

2.3.3 Connections: Bolt or weld shop connections as indicated. One sided or other types of eccentric connections will not be permitted unless shown in detail on the shop drawings.

.1 Make welded connections in accordance with AWS D1.1-96. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

.2 Grind and dress smooth, welds exposed to view in the finished construction, so that the shape and profile of the item welded is preserved.

2.3.4 Joints: Compression joints depending upon contact bearing shall have bearing surfaces truly milled perpendicular to their axis. Cut or dress other joints straight and true.

2.3.5 Holes: Cut, drill, or punch holes at right angles to the surface of the metal. Do not enlarge holes by burning, however holes may be enlarged by careful reaming. Holes in base or bearing plates shall be drilled. Holes shall be provided in members to permit connecting the construction of other trades.

2.3.6 Marking: Mark members for erection in accordance with shop drawings. Members weighing over 4 tons shall have the weight so marked on the member. Long members shall be loaded onto the trucks and so marked.

2.4 SHOP PAINTING:

2.4.1 General: Shop paint structural steel except galvanized members or those members or portions of members to be embedded in concrete or mortar. On embedded steel which is partially exposed, paint the exposed portion and the initial 2 inches of embedded areas only. Do not paint surfaces to be welded or high strength bolted with friction-type connections. Do not paint surfaces which are scheduled to receive sprayed-on fireproofing.

2.4.2 Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale and spatter, slag or flux deposits as follows:

.1 Surface preparation for concealed members and for interior AESS members shall be power tool cleaning in accordance with SSPC SP3.

.2 Surface preparation for exterior AESS members shall be commercial blast cleaning in accordance with SSPC SP6.

2.4.3 Painting: Immediately after surface preparation, apply shop primer in accordance with manufacturer's instructions and at a rate to provide a dry film thickness of not less than 1.5 mils. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.

2.5 GALVANIZING:

2.5.1 General: All steel and ferrous metal items located on the exterior of the building, or otherwise specifically indicated to be galvanized, shall be galvanized by the hot-dip process, meeting the requirements of ASTM A 123. All required hot-dip galvanizing shall be done after fabrication, in the largest sections possible. Items too large for available dip tanks shall be sprayed, by approved methods, with molten zinc to coating thickness of 0.003 inch to 0.004 inch.

2.5.2 Coating Weight: Weight of the zinc coating per square foot of actual surface shall average not less than 2.0 ounces and no individual specimen shall show less than 1.8 ounces.

2.5.3 Repair of Coating: Restore shop galvanized metal necessitating field soldering or welding which in any manner removes original galvanizing, by using galvanizing repair compound in accordance with the manufacturer's instructions.

PART 3 - EXECUTION

3.1 PREPARATION:

3.1.1 Field Measurements and Templates: Secure field measurements required for proper and adequate fabrication and installation. Furnish templates for exact location of items to be embedded in concrete and setting instructions required for installation.

3.1.2 Temporary Shoring and Bracing: In accordance with California Code of Regulations (CCR) Title 8, design and provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structure as erection proceeds.

3.1.3 Temporary Planking: Provide temporary planking as required by CCR Title 8 and as necessary to effectively complete the construction.

3.2 ERECTION:

3.2.1 Setting Base and Bearing Plates: After the supported members have been plumbed, aligned and properly positioned, set base and bearing plates. Support plates on adjustable bolt supports or shims until grout has set. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Follow the grout manufacturer's instructions.

3.2.2 Framing: Except as specified herein, erect framing in accordance with the AISC Code of Standard Practice and CBC. Plan and lay out framing so that cutting will not be required. Erect the construction plumb; square; and true to line, level, and position indicated within tolerances established in the AISC Code of Steel Practice.

3.2.3 Holding and Protection: In assembling and during welding, hold the component parts with sufficient clamps or other adequate means to keep parts straight and in close contact. In welding, take precautions to minimize "lock-up" stress and distortion due to heat. In wind, perform welding only after adequate wind protection is furnished and set up.

3.2.4 Connections: Bolt field connections except where welding is indicated. Perform welding as specified for shop welding. Provide high strength bolted connections for principle bolted connections where indicated. Provide common bolted connections for secondary connections and other bolted connections not indicated otherwise. Install high-strength bolts in accordance with AISC/RCRBSJ "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts".

3.2.5 Camber: Inspect beams and girders in the shop for camber and align so that they are fabricated and erected with their camber turned upwards. Camber shall not exceed the requirements of the governing documents unless approved by the Architect.

3.2.6 On exposed construction, remove erection bolts, temporary welds, run-off plates and backing strips. Fill holes from erection bolts with plug welds and grind smooth.

3.3 FIELD INSPECTION AND TESTING:

3.3.1 Inspection and testing are specified in Division 1.

3.4 AS ERECTED DRAWINGS:

After all steel has been erected, correct or revise the shop drawings and erection diagrams to correspond with the changes made in the field. Refer to requirements specified in Division 1.

END OF SECTION

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Furnishing and installing of all miscellaneous metal fabrications and related connections complete as indicated and as specified.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions referenced herein of Federal Specifications (Fed. Spec.) and of the other standards and specifications published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

Aluminum Association (AA)
American National Standards Institute (ANSI)
American Institute of Steel Construction (AISC)
American Society for Testing and Materials (ASTM)
American Welding Society (AWS)
National Association of Architectural Metal Manufacturer's (NAAMM)

1.3 SUBMITTALS:

1.3.1 Shop Drawings:

.1 Submit shop drawings of miscellaneous metal work giving sizes, details of fabrication and construction, methods of assembly and bracing, and locations of hardware, anchors, and accessories.

.2 Include shop and erection details, including cuts, copes, connections, holes, bolts and welds. Indicate welds, both shop and field, by standard welding symbols in the latest edition of AWS D1.1. Show the size, length and type of each weld. All materials to be brazed or soldered shall have connections indicated by symbols which are industry standards.

.3 Contractor shall be responsible for all fabrication and for correct fitting of metal members shown on shop drawings.

1.3.2 Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 REGULATORY REQUIREMENTS:

Provide products meeting the accessibility requirements of the 2016 California Building Code (CBC) Title 24 Part 2 Chapter 11 - Accessibility; and ADA Accessibility Guidelines for Buildings and Facilities, dated June 26, 1991 as amended April 5, 1993 and January 18, 1994, and July 2004.

1.5 DELIVERY, STORAGE AND HANDLING:

Deliver material in time to insure uninterrupted progress of the work. Store materials in a manner to preclude damage and permit ready access for inspection and identification of each shipment. Store steel materials, either plain or fabricated, above the ground upon platforms, pallets, skids, or other supports. Keep materials free from dirt, grease, and other foreign matter, and protect from corrosion. Material showing evidence of damage will be rejected; immediately remove rejected materials from the work.

1.6 FIELD MEASUREMENTS:

Secure all field measurements required for proper and adequate fabrication and installation of the work. Furnish templates for exact location of items to be embedded in concrete and masonry and setting instructions required for all installation work.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Aluminum:

- .1 Rolled Structural Shapes: ASTM B 308, 6061 alloy.
- .2 Plates: ASTM B 209, 6161-T6 alloy and temper.
- .3 Extrusions: ASTM B 221, alloy and temper specified for each item specified herein.
- .4 Sheet: ASTM B 209, alloy and temper specified for each item specified herein.
- .5 Tubing: ASTM B 241, 6063-T6 alloy and temper.
- .6 Castings: ASTM B 26, 214 alloy.

2.1.2 Ferrous Metal:

- .1 Steel, Rolled Shapes, Bars and Plates: Standard structural sections, ASTM A 36.
- .2 Steel Tubing: ASTM A 501 or ASTM A 500, grade B, seamless.
- .3 Steel Pipe: ASTM A 53, Type E or S, Grade B, schedule 40, unless otherwise specified.
- .4 Structural Steel Sheet:
 - a. Uncoated Sheet: Hot-rolled, ASTM A 570; or cold-rolled ASTM A 611, Class 1; of grade required for design loading.
 - b. Galvanized Sheet: ASTM A 653, Grade SQ, coating designation of G-90 unless otherwise indicated or specified.
- .5 Commercial Quality Steel Sheet:
 - a. Uncoated Sheet: Hot-rolled, ASTM A 569; or cold-rolled ASTM A 366, of grade required for design loading.

- b. Galvanized Sheet: ASTM A 653, Grade CQ, coating designation of G-90, unless otherwise indicated or specified.
- .6 Wrought Iron: ASTM A 29, weldable quality, low carbon mild steel.
- .7 Gray Iron Castings: ASTM A 48, Class 30.
- .8 Ductile Iron Castings: ASTM A 536, Class 64-45-12.
- .9 Malleable Iron Castings: ASTM A 47, grade as selected by the fabricator.
- .10 Anchors, Bolts, and Fastenings: ASTM A 307, Grade A and ASTM A 563.
- .11 Electrodes: AWS A5.1-91 or A5.5-96 E60XX or E70XX.
- .12 Cable: ASTM A 603, Class C zinc-coating, fiber core, wire rope, 6 x 19 class, 3/8 inch diameter enclosed within a vinyl sleeve. Furnish cable with fittings and turnbuckles fabricated from new billet steel conforming to ASTM A 668, Class D, with strength adequate to develop the full strength of the cable.
- .13 Pipe Sleeves: Pipe sleeves through concrete walls and footings shall be standard weight, wrought iron, mild steel, or cast iron sleeves with not less than 1/2 inch space all around between the sleeve and pipe.

2.1.3 Stainless Steel:

- .1 Structural Shapes and Bars: ASTM A 276.
- .2 Sheets: ASTM A 167.
- .3 Pipe: ASTM A 269.
- .4 Tubing: ASTM A 312.
- .5 Cable: ASTM A 492, 6 x 25 Class, IWRC, 1/2 inch diameter complete with stainless steel cable fittings and turnbuckles with strength adequate to develop the full strength of the cable.

2.1.4 Shop Primer:

- .1 Exterior Handrails and elsewhere as indicated: High-build epoxy-polyamide primer. Acceptable products or equal:
 - Carboline Co.; No. 893
 - Rust-O-Leum Corp.; No. HS 9369
 - The Sherwin Williams Co.; No. B67 H 5/V 5
 - Tnemec Co., Inc.; Epoxoline 66-1211
- .2 All Other Steel Surfaces: Fast curing, lead and chromate free, modified alkyd primer. Acceptable products or equal:
 - Carboline Co.; No. GP-20 or GP-818
 - Rust-O-Leum Corp.; No. 678 or 7669
 - The Sherwin Williams Co.; No. B50 N 2 or B50N Z 6

Tnemec Co., Inc.; 10-99 or P10-99

2.1.5 Galvanizing Repair Compound: High zinc dust content galvanizing repair paint meeting the requirements of ASTM A 780 or hot applied zinc rich material. Acceptable products or equal:

American Solder & Flux; Drygalv
Kenco Div.; Galvicon
Metalloy Products Co.; Galvalloy

2.1.6 Quick Setting Hydraulic Cement: Acceptable products or equal:

The Burke Co.; Burke Plug
Minwax Construction Products Div.; Super Por-Rok
Tamms Industries Co.; Tammstech Rapid Rock
Master Builders; Masterflow 713

2.1.7 Nonmetallic, Nonshrink Grout: For grout in exposed to view locations use premixed, nonmetallic, non-corrosive, non-staining grouting compound containing silica sands, portland cement, shrinkage compensating agents and water reducing agents, meeting the requirements of ASTM C 1107. Acceptable products or equal:

Gifford Hill & Co., Inc.; Supreme
Master Builders; Masterflow 713
The Upco Company; Upcon Nonshrink

2.1.8 Polymer Modified Concrete: High strength, polyester resin polymer concrete having the following physical properties:

Property	Test Method	Requirement
Compressive Strength	ASTM C 39	14,000 psi min.
Tensile Strength	ASTM C 78	1,500 psi min.
Water Absorption	ASTM C 140	1.0 % max.

2.2 PREFABRICATED PRODUCTS:

2.2.1 Trench Drain Grating: Cast iron grate and frame, sizes as indicated. Acceptable product or equal:

Neenah Foundry; No. R-4991-AX

2.3 FABRICATION:

2.3.1 Metal Surfaces: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

2.3.2 Fabricate and assemble materials in the shop to the greatest extent possible. Perform shearing, flame cutting, and chipping carefully and accurately. Coordinate all connection details to concrete or masonry. Verify all lines, levels, and dimensions, where possible, just before commencing fabrication of connection details. Correct work that does not fit. Schedule and coordinate work under this section with that specified elsewhere in order to produce a workmanlike installation. When not otherwise indicated or specified, comply with applicable requirements of AISC

"Specifications for Design, Fabrication and Erection of Structural Steel for Buildings". Finish surfaces of exposed members smooth and free of markings, burrs, or other defects.

2.3.3 Bolt, braze or weld connections as indicated. One-sided or other types of eccentric connections will not be permitted unless indicated, and shown in detail on the shop drawings.

2.3.4 Cut, drill, or punch holes at right angles to the surface of the metal; do not enlarged by burning. Drill holes in base or bearing plates. Provide holes in members to permit connecting the work of other trades.

2.3.5 Galvanizing:

.1 Galvanizing for rolled, pressed and forged steel shapes, plates, bars and strip and for assembled steel products: Zinc coating meeting the requirements of ASTM A 123.

.2 Galvanizing for iron and steel hardware: Zinc coating meeting the requirements of ASTM A 153.

2.3.6 Shop Painting: Apply shop primer to surfaces of metal fabrications except those which are galvanized or indicated to be embedded in concrete or masonry, unless otherwise indicated.

2.4 GUARD POSTS (BOLLARDS):

Fabricate guard posts from galvanized extra heavy weight (Schedule 80) steel pipe set in a concrete foundation and filled with concrete. Concrete shall be 2000 psi in accordance with Section 03 30 00.

2.5 COUNTER SUPPORTS:

Fabricate counter supports of welded steel angles of sizes and shapes indicated. Grind exposed welds smooth. Provide complete with attachments to framing and counters. Counters are specified in Section 06 41 20.

2.6 STRUCTURAL STEEL DOOR FRAMES:

Fabricate steel door frames of structural shapes, fully welded, uniform, square, and true. Continuously weld exposed joints; grind exposed welds smooth. Provide steel anchors for securing into adjoining construction. Weld anchors to frames not more than 12 inches from both top and bottom and space anchors not more than 24 inches apart.

2.7 MISCELLANEOUS ROLLED STEEL PLATES AND SHAPES:

Provide for corner guards, sills, anchor plates for elevator guide rails, mechanical equipment supports and other locations indicated or required to complete the work.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS:

Steel and miscellaneous metal work shall conform with the applicable requirements of the referenced "Codes and Standards". Details indicated are typical, similar details apply to similar conditions. Check drawings for dimensions, elevation, size, and locations of installations. Supply miscellaneous metal items in ample time for incorporation in the work. Include reinforcing angles, plates, straps, brackets, hangers, clips, lugs, holes, sleeves, shims, other hardware as indicated or

required for erection of steel and miscellaneous metal work and as required to complete the work as indicated.

3.2 WELDED CONNECTIONS:

3.2.1 All welders shall be certified qualified welders. All welders welding light gage metal shall be qualified for light gage metal welding.

3.2.2 Welded connections shall be made in accordance with AWS D1.1. All welding shall be done in the shop unless otherwise indicated or specified.

3.2.3 All welds and other connections exposed in the finished work shall be ground and dressed smooth and so that the shape and profile of the item welded is preserved.

3.3 INSTALLATION:

3.3.1 Install miscellaneous metal items as rapidly as the progress of other work will permit. Make splices and field connections with bolts, except where welding or brazing is indicated or approved on the shop drawings. Install fasteners as specified herein.

3.3.2 Set metal work accurately at the established lines and levels. Install work in strict accordance with approved drawings and actual conditions, true and horizontal or perpendicular as the case may be, level and square with angles and edges parallel with related lines of the building.

3.3.3 Anchor bolts, anchors, block-outs and sleeves shall be properly located and built into connecting work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

3.3.4 After assembly, the various members forming parts of a completed frame shall be aligned and adjusted accurately before being fastened. Tolerances shall conform to the applicable requirements of AISC "Code of Standard Practice". Contact shall be cleaned before the members are assembled. Poor matching of holes shall be corrected by drilling to the next larger size.

3.3.5 Wall Supported Items: Attach ladders and handrails and other wall hung items by bolting to metal reinforcing installed behind the finish material and welded to the steel studs or by expansion anchors in concrete and masonry walls, and by lag bolting to blocking installed between wood studs.

3.4 GALVANIZED FINISH:

Touch up all damaged galvanized finish due to installation, welding, threading or other work with treatment specified herein.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Rough carpentry work.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated.

1.2 REFERENCES:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Plywood Association (APA)
American Society for Testing and Materials (ASTM)
American Wood Protection Association (AWPA)
National Institute for Standards and Technology (NIST)
Redwood Inspection Service (RIS)
U. S. Department of Commerce (USDC)
West Coast Lumber Inspection Bureau (WCLIB)
Western Wood Products Association (WWPA)

1.3 SUBMITTALS:

1.3.1 Product Data: Submit copies of current International Code Council Evaluation Service Reports (ICC ESR's) for framing anchors, powder driven fasteners, and fire-retardant treated wood.

1.3.2 Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installing and finishing of treated materials.

.1 Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.

.2 Water Borne Treatment: Include statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

.3 Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with specified standard and other requirements.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Regulatory Requirements:

.1 Rough carpentry shall conform to the 2016 California Building Code (CBC), Chapter 23 – Wood.

.2 Framing anchors and powder driven fasteners shall be furnished and installed in accordance with the manufacturer's current ICC ESR's.

1.4.2 Grade Marks:

.1 Identify lumber by the official grade mark of WCLIB, WWPA or RIS.

.2 Identify plywood by the official grade mark of APA.

.3 Identify pressure preservative treated lumber and plywood with the official grade mark of AWPA.

.4 Identify fire retardant treated lumber with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection or other testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Deliver materials to the site in an undamaged condition.

1.5.2 Store lumber and plywood at the site under cover or otherwise protected against exposure to weather, raised above the ground and out of contact with other damp or wet surfaces. Stack lumber and plywood and provide for air circulation within and around the stacks and under temporary coverings. For pressure treated lumber and plywood, provide spacers between courses to permit air circulation.

1.6 PROJECT CONDITIONS:

Cooperate with other trades in coordinating their work with the work of this section. Provide wood grounds, blocking and nailers where indicated or as required for integration of work of other trades into the structure.

PART 2 - PRODUCTS

2.1 LUMBER:

2.1.1 Lumber Standards: Manufacture lumber to comply with NIST PS 20-05 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies specified herein.

2.1.2 Moisture Content at Time of Placing:

.1 Untreated Lumber: Not exceed 19 percent.

.2 Treated Lumber: Not exceed 19 percent after pressure treatment.

2.1.3 Sizing and Surfacing: Sizes indicated are nominal; provide actual sizes in accordance with PS 20-05. Provide dressed lumber, S4S, except as otherwise indicated.

2.1.4 Dimension Lumber: Provide lumber of the grades and species listed

below for the various purposes, graded in accordance with WCLIB "Standard Grading Rules No. 17", WWPA "Western Lumber Grading Rules 91", or RIS "Standard Specifications for Grades of California Redwood Lumber," Latest Edition.

.1 Sill Plates, Cants, Roof Nailers, and Roof Curbs: Standard or better grade Light Framing; No. 2 or better grade Structural Light Framing; or Stud grade of any commercial softwood species. All lumber used for sill plates, cants, roof nailers, and roof curbs shall be pressure preservative treated.

.2 Blocking, Nailers, Top Plates and Bracing: Standard or better grade Light Framing; No. 2 or better grade Structural Light Framing; or Stud grade of any commercial softwood species.

.3 Studs: Construction grade Light Framing; No. 1 grade Structural Light Framing; or Stud grade of any commercial softwood species.

.4 Joists, Headers, Ledgers, and Stair Stringers: No. 2 or better grade Joists and Planks of Douglas fir or Larch.

.5 Rafters: No. 1 grade Structural Light Framing of Douglas Fir or Larch.

.6 Beams, Girders, and Stringers: No. 1 grade Beams and Stringers of Douglas Fir or Larch.

.7 Columns and Posts: No. 1 grade Posts and Timbers of Douglas Fir or Larch.

.8 Exposed Framing Lumber: Exposed framing lumber refers to dimension lumber which is not concealed by other work and is indicated to receive a stained or natural finish. Provide appearance grade framing or hand select materials from No. 1 grade to provide appearance equal to appearance grade. Provide exposed framing of same species and grade as specified for structural framing.

2.2 PLYWOOD:

2.2.1 Plywood Standards: Manufacture plywood to comply with PS 1-07 – Structural Plywood.

2.2.2 Subflooring: Structural I rated, C-C grade, Exterior exposure durability classification, span rating as indicated on Drawings.

2.2.3 Wall Sheathing: APA Rated Sheathing, C-D grade, Exposure 1 durability classification, thickness and span rating as indicated on Drawings.

2.2.4 Roof Sheathing: Structural I rated, C-C grade, Exterior exposure durability classification, span rating as indicated on Drawings.

2.2.5 Interior Shear Walls: Structural I rated, C-D grade, Interior durability classification, thickness and span rating as indicated on Drawings.

2.2.6 Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels designation, C-D Plugged grade, interior type with exterior glue, 3/4 inch thick, unless otherwise indicated.

2.3 PRESSURE TREATMENT:

2.3.1 Preservative Treatment: Where lumber or plywood is indicated or specified herein to receive pressure preservative treatment, treat materials in accordance with AWPA Standard U1-08.

Complete fabrication of treated items before treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment.

2.3.2 Fire-Retardant Treatment: Where fire-retardant treated wood is indicated, pressure impregnate lumber and plywood with fire-retardant chemicals to meet the requirements of AWPA Standard U1-08; identify fire-retardant-treated wood with appropriate classification marking of Underwriters Laboratories, or other testing and inspecting agency acceptable to local authorities.

2.4 GYPSUM SHEATHING:

Gypsum sheathing board consisting of noncombustible gypsum core incorporating a water-resistant material, surfaced on face, back and long edges with water-repellent paper meeting the requirements of ASTM C 79-04, Type X, V-shaped tongue and groove long edges, square ends, 5/8 inch thick.

2.5 WOOD FIBER SOUND BOARD:

Cellulosic cellulose fiber insulating board meeting the requirements of ASTM C 208-95 (2001), 1/2 inch thick, 0.82 pounds per square foot density, Sound Deadening Grade. Acceptable product or equal:

Celotex Corp.; Soundstop

2.6 MISCELLANEOUS MATERIALS:

2.6.1 Building Paper: Fully waterproof Kraft paper conforming to Fed. Spec. UU-B-790A (1), Type I, Grade B (moderate water vapor resistance).

2.6.2 Rough Hardware:

.1 Furnish items of rough hardware, connections, bolts, required to complete the work. Where carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide nails, bolts, nuts, washers and other fasteners with a hot-dipped zinc coating in accordance with ASTM A 153-03.

.2 Nails: Common wire. Use ring shank nails for floor sheathing. Special nailing requirements shall be as indicated, complying with ASTM F 1667-08.

.3 Bolts: Standard mild steel, square or hexagonal head machine bolts with matching nuts and cut washers, or carriage bolts with square nuts and cut washers as indicated.

.4 Lag Bolts and Screws: Sizes indicated.

.5 Toggle Bolts: Sizes indicated.

2.6.3 Powder Driven Fasteners: Provide fastener systems complete with all necessary washers, nuts and other appurtenances. Acceptable products or equal:

Hilti, Inc.
ITW Ramset

2.6.4 Framing Connectors: Provide galvanized steel joist hangers and other framing anchors having the minimum design and load capacities indicated. Load capacities shall be those shown in the manufacturer's current ICC ESR's. Acceptable manufacturers or equal:

Simpson Strong Tie
Silver Metal Products, Inc.

2.7 MISCELLANEOUS ITEMS:

Rough carpentry work and miscellaneous items and their related components are not necessarily individually described. The most important features and those requiring detail description are mentioned. Furnish rough carpentry work and miscellaneous items not mentioned or described and install in accordance with the intent of the drawings and specifications and as required to complete the work.

PART 3 - EXECUTION

3.1 EXAMINATION:

Before commencing work, check concrete and masonry walls, steel and glue-laminated beams, and other construction supporting rough carpentry work to ensure that they are set to the lines and levels indicated within the specified tolerances. Do not proceed until discrepancies have been corrected or adjusted.

3.2 INSTALLATION:

3.2.1 Install wood framing, making proper provisions for work of other trades. Do framing of wood required to accommodate plumbing, heating and ventilating, electrical, and other trades. Fit neatly around exposed items, such as outlet boxes, conduit, pipes, and ducts.

3.2.2 Wood Grounds, Nailers, Blocking and Sleepers:

.1 Provide wherever indicated and where required for screeding or attachment of other work. Form to shapes as indicated and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

.2 Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

.3 Provide permanent grounds of dressed, preservative treated, key beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.2.3 Wood Furring:

.1 Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work. Firestop furred spaces on walls at each floor level and at ceiling line of top story, with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

.2 Furring to Receive Gypsum Board: Provide 1" by 2" furring at 16 inches on center, vertically, unless otherwise indicated.

.3 Furring to Receive Lath and Plaster: Provide 1" by 2" furring at 16 inches on center, vertically, unless otherwise indicated.

.4 Suspended Furring: Provide size and spacing indicated, including hangers and attachment devices. Level to a tolerance of 1/8 inch in 10 feet, except 1/4 inch in 10 feet for plaster.

3.2.4 Wall Framing:

.1 Provide single plates at bottom and double at top, except as otherwise indicated. Stagger splices in top plates not less than 48 inches except as otherwise indicated. Reinforce plates on both sides which are cut for the passage of pipes and similar items, with 12 gage by 1-1/2" by 18" steel plates punched for eight 16d nails.

.2 Anchor plates of exterior and interior shear walls to concrete foundations with fasteners of size, length and spacing indicated. Unless otherwise indicated, anchor plates for other partitions to concrete floors with 0.156" diameter by 3" long powder driven fasteners spaced not to exceed 32 inches apart.

.3 Furnish and set columns and studding of size, spacings, and locations indicated. Unless indicated otherwise, studding for furring and partitions shall be 2" by 4" set 16 inches on center. Extend cripples to the floor plates. Install blocking in studding over 8 feet tall at half height, double-nailed at each end. Construct corners and intersections with not less than 3 studs.

.4 Frame openings with double jamb studs and headers of sizes indicated. Set headers on jamb studs and nail securely.

.5 Provide diagonal bracing for exterior walls except where walls are covered with plywood sheathing or siding. Brace walls at each external corner with 1" by 4" wood let into studs or metal bracing extending at a 45 degree angle over top and bottom plates.

3.2.5 Joist Framing: Set joists with the crown edge up with minimum 1-1/2 inch bearing on wood or metal supports. Where openings occur, headers and supporting joists shall be doubled and headers and tail joists shall be hung on metal hangers.

.1 Framing system and sizes shall be as indicated. Install solid blocking at ends and over supports. Provide 2" by 3" cross-bridging, metal bridging or solid blocking in spans where indicated or at 8 feet on center in spans over 10 feet where not indicated.

.2 Lap joists framing from opposite sides of beams, girders or partitions not less than 4 inches or structurally tie opposing members together with metal framing connectors. Over supports provide solid blocking of same size as joists.

.3 Provide doubled floor joists under partitions running parallel with the joists. Where necessary for passage of pipes or ducts space doubled joists as required for pipe or duct clearance and install solid blocking between joists at 4 feet on center and nail securely.

.4 Install joist hangers where indicated using nails of sizes and types listed in manufacturer's ICC ESR's.

.5 Include furring or stripping, properly shimmed and leveled, where indicated or required for ceiling finishes.

3.2.6 Rafter Framing: Set rafters accurately to form a true plan. Notch rafters to provide full bearing on plates.

.1 Provide headers and trimmers around openings in the roof. Headers and trimmers carrying or supporting two or more rafters shall be doubled.

3.2.7 Fire Blocking: Install as indicated and where required by the CBC Chapter 23.

3.2.8 Openings: Provide openings for mechanical and electrical equipment, ducts, other equipment. Where one or more joists are cut, the joists supporting the trimmers shall be doubled and well spiked. Where continuation of 3 or more joists is interrupted, reinforce the abutting headers and joists with approved type of joists hangers.

.1 Frame openings in walls required for the installation of cabinets and other wall hung items, including telephone and electrical terminals, stair handrails, shelves, toilet partitions, fixtures and equipment.

3.2.9 Subflooring and Wall and Roof Sheathing: Install as indicated. Provide solid bearing under edges of subflooring and sheathing. Lay sheets with 1/16 inch space between sheets at ends and 1/8 inch space at edge joints. Inspect subflooring and roof sheathing carefully as soon as it is laid to determine its adequacy to support workmen and the normal loads which it will receive. Protect roof sheathing from weather until roofing is installed by applying building paper or polyethylene sheeting.

3.2.10 Secure approval of Architect before cutting, drilling or notching wood members that may weaken the member. Lay out framing so that structural members will not require cutting for openings, pipes, vents, ducts.

3.2.11 Gypsum Wall Sheathing: Fasten to exterior face of stud framing using 1-1/2 inch long, 11 gage galvanized roofing nails with 3/8 inch head or 15 gage divergent point galvanized staples 1/2 inch wide by 1-1/2 inches long. Keep perimeter fasteners 3/8 inch from edges and ends of boards. Fit board tightly against each other and around openings. Install boards with grooved edge down. Center end joints over supports and stagger in each course.

3.2.12 Wood Fiber Sound Board: Locate fasteners not less than 3/8 inch nor more than 1/2 inch from edges and ends of board. Drive fasteners perpendicular to the board surface with heads set even with the surface. Attach board starting from the center of each panel and proceeding toward the outer edges. Fasten in place with screws over metal framing and with nails or screws over wood framing.

3.3 LUMBER FASTENINGS:

3.3.1 Nailing and bolting of wood members shall conform to the minimum requirements of the CBC Chapter 23, and as specified herein and as indicated.

3.3.2 Bolting: Bolts shall be standard stock machine bolts as specified. Exposed bolts shall be all square or hexagonal head with matching nuts. Retighten bolted connections before final acceptance or, in the case of bolted connections in concealed locations, immediately before the area is sealed off.

3.3.3 Nailing: Connectors shall be as indicated in UBC Table 2304.9.1 where not otherwise indicated. Nails shall be untreated steel for interior work and concealed framing, and galvanized for all exposed work on exterior. Unless connectors are detailed or steel connectors indicated, nails shall not be driven closer together than 1/2 of their length nor closer to the edge of a member than 1/4 their length. When wood tends to split with size of nail used, pre-drill holes for nails. Penetration of nails or spikes into pieces shall be not less than one-half the length of the nail or spike.

3.3.4 Washers: Provide all bolts and lag screws bearing on wood with cut washers except where malleable iron or plate washers are indicated on the structural drawings.

3.3.5 Metal Framing Connectors: Install connectors in accordance with the manufacturer's current ICC ESR's.

3.4 ROUGH HARDWARE:

Furnish and install all stock items of rough hardware as indicated or required, including clips, anchors, hangers, bolts, ties, and plates for connecting wood framing members to wood, concrete, or steel, except as specified to be provided under other connections.

3.5 BUILDING PAPER:

3.5.1 Install building paper horizontally over all plywood sheathing on exterior walls and elsewhere as indicated. Lap 2 inches to weather, with 4 inch side laps. Secure sufficiently with galvanized nails to hold in place without sagging until finish is applied. Building paper behind cement plaster, where required, is specified in Section 09 20 80.

3.5.2 Install building paper on all plywood subfloors over first layer of plywood. Sweep floors clean before laying building paper. Lay building paper over plywood lapping all sides and ends 6 inches and secure with staples sufficiently to hold paper securely and smoothly in place until underlayment plywood is stapled in place. There shall be no tears or holes in building paper, and suitable protection shall be provided until underlayment plywood is in place.

3.5.3 Install waterproof building paper around all openings in wood framed exterior walls and elsewhere as indicated, properly flashed with felt.

END OF SECTION

LAMINATE-CLAD WOOD CABINETS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Plastic laminate-clad wood cabinets, with solid surface countertops.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Iron and Steel Institute (AISI)
American Society for Testing and Materials (ASTM)
Architectural Woodwork Standards (AWI)
National Electrical Manufacturers' Association (NEMA)
U.S. Department of Commerce (DOC)
Woodwork Institute (WI)

1.3 SUBMITTALS:

1.3.1 Shop Drawings:

.1 Submit Shop Drawings showing list of materials and hardware, sizes, sections, elevations and details of construction and assembly as required by Architectural Woodwork Standards – Latest Edition.

.2 Indicate grounds, backing, blocking, sleepers and other items required for the installation of cabinet work which are to be furnished and installed as part of the structure.

.3 Affix the WI Certified Compliance Grade Label to the first page of the Shop Drawings, certifying that the cabinets will be manufactured in accordance with the WI grade specified.

1.3.2 Samples: Submit the following samples:

.1 Plastic Laminate: Submit samples of each type of plastic laminate, including complete color and pattern range and surface finish.

.2 Exposed Cabinet Hardware: Submit one unit of each type and finish. Approved samples may be used in the work.

.3 Submit 6" square samples of solid surfacing material for countertops for initial selection and verification after selection has been made.

1.3.3 Product Data: Submit manufacturer's product data for plastic laminate and solid surfacing material showing installation and maintenance recommendations.

1.3.4 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Regulatory Requirements: Wall hung cabinets and floor supported cabinets over 5 feet high shall be braced and anchored in accordance with the 2016 California Building Code (CBC) Title 24 Part 2, Table 16-O.

1.4.2 Manufacturing Standards:

.1 Cabinets: Manufacture plastic laminate faced cabinet work in accordance with Architectural Woodwork Standards, Latest Edition, Section 10, Casework, Premium Grade, except as modified herein.

.2 Countertops:

a. Plastic Laminate Countertops: Manufacture plastic laminate countertops in accordance with Architectural Woodwork Standards, Latest Edition, Section 11, Counter Tops, Splashes, and Wall Paneling, Custom Grade.

b. Solid Surface Countertops: Manufacture solid surface countertops in accordance with Architectural Woodwork Standards, Latest Edition, Section 11, Counter Tops, solid surface countertops.

1.4.3 Certificate of Compliance: Before delivery to the project site, issue a WI Certified Compliance Certificate, certifying that the cabinets and countertops meet requirements of WI Grade specified. Further, label each unit of plastic laminate cabinets and each plastic laminate countertop with the Certified Compliance Grade Label indicating WI Grade specified.

.1 After completion issue a WI Certified Compliance Certificate for Installation.

1.4.4 Reinspection: In case of a dispute concerning quality of the casework, a reinspection of the casework by a representative of WI shall be conducted at no additional cost to the Owner.

1.5 DELIVERY, STORAGE, AND HANDLING:

Do not deliver materials until project construction is ready for installation. Provide a clean storage area as required by Architectural Woodwork Standards, Latest Edition, Section 2, Care and Storage.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Plastic Laminate: Meet the requirements of NEMA LD3.

.1 Horizontal Surfaces: NEMA GP 50, nominal 0.050-inch-thick, except where postforming type is required provide NEMA PF-42, nominal 0.042 inch thick.

.2 Vertical Surfaces: NEMA GP-28, nominal 0.028 inch thick.

.3 Cabinet Liners: Comply with Architectural Woodwork Standards, Section 10 for Grade specified.

.4 Backing Sheets: Comply with Architectural Woodwork Standards, Section 10 for Grade specified.

.5 Surface Finish: Satin finish, color as selected by the Architect from full range of colors and patterns.

.6 Acceptable manufacturers or equal:

Formica
Micarta
Nevamar
Wilsonart

2.1.2 Glass for Doors and Shelves: Clear tempered float glass as specified in Section 08 80 00. Grind all edges smooth before tempering.

2.1.3 Solid Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements of ANSI Z124.3, for Type 5 or Type 6, without a precoated finish. Acceptable products or equal:

Avonite, Inc.; Avonite
DuPont Polymers; Corian
Formica Corp.; Surell
Swan Corporation; Swanstone
Wilsonart International; Gibraltar

2.1.4 Hardboard: Meet or exceed Commercial Standard CS-251 and Fed. Spec. LLL-B-00810, tempered, 1/4-inch-thick, smooth both sides. Pre-finish exposed surfaces in color to match cabinet interior, pre-finish opposite surface with neutral color balance coating.

2.1.5 Edges: 3mm purified PVC edge bands of size to suit material thickness, colors as selected by the Architect from manufacturer's standard colors, hot melt applied to edges of cabinet ends, shelves, doors, and drawer fronts.

2.1.6 Stainless Steel: AISI 18-8, Type 302 or 304 with a No. 4 satin finish.

2.1.7 Galvanized Sheet Steel: ASTM A 653.

2.2 FABRICATION:

2.2.1 Cabinets: Fabricate cabinets to meet Architectural Woodwork Standards, Section 10 Frameless, Construction Type I. Provide finished end panels of either applied panels or integral members on exposed ends of cabinets. Close gaps at walls with filler panels not to exceed 1-1/2 inches wide.

.1 Semi-Exposed Surfaces: Finish semi-exposed surfaces of open cabinets or behind glass doors to match exposed surfaces.

.2 Cabinet interiors (other than semi-exposed surfaces) including faces of shelving therein, and interior door faces: Finish with cabinet liner to comply with Architectural Woodwork Standards, Section 10 for Grade specified, color as selected by the Architect.

2.2.2 Drawer Boxes: Provide with subfronts and applied finish fronts securely fastened, with square corners, edges finished with plastic laminate or 3mm purified PVC. Provide drawers with metal slides as specified.

2.2.3 Doors: Flush overlay type, hinged to swing flat against the face of adjoining cabinet or the side of cabinet, with square corners, and edges finished with plastic laminate or 3mm purified PVC. Do not notch door or cabinet ends, or divisions to receive hinge.

2.2.4 Door and Drawer Fronts: Vertical grade plastic laminate covered, 13/16 inch thick. Core material shall be 3/4-inch-thick, 45-pound density particle board with balancing sheet on interior face. Finish exposed edges with plastic laminate or 3mm purified PVC, color as selected by the Architect, hot-melt applied.

2.2.5 Shelves: Comply with Architectural Woodwork Standards for 50 pounds per square foot load test. Do not recess metal shelf standards into the end panels; notch shelving to clear standards.

.1 Hardboard Shelves and Dividers: Tempered, smooth both sides, 1/4 inch thick.

2.2.6 Toe Kick Base: Furnished and installed under Section 09 65 00.

2.2.7 Countertops and Splashes:

.1 Plastic Laminate: Custom Grade in accordance with Architectural Woodwork Standards, Section 10 through color plastic laminate covered, including covered top to splash joints, exposed edges and ends rolled, except where hardwood edges are indicated.

.2 Solid Surface: Fabricate in accordance with Architectural Woodwork Standards, Section 10, Premium grade.

a. Top Thickness: 3/4 inch. Provide front and end overhang of 1 inch over base cabinets, formed with continuous drip groove on under surface 1/2 inch from edge.

b. Fabricate tops in one piece with shop applied backsplashes and edges, unless otherwise indicated. Comply with solid surfacing material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

2.3 HARDWARE:

2.3.1 Hinges: Heavy duty wraparound offset for overlay doors with non-removable pin; flat black or dull chrome finish.

2.3.2 Pulls: Provide U shaped wire pulls at all accessible casework or equally accessible pull hardware. Surface mounted aluminum, US 28 finish. Acceptable products or equal:

Builders Brass Works; 9054
Quality Hardware; No. 812

2.3.3 Catches:

.1 Doors without locks: Magnetic type with aluminum case. Acceptable products or equal:

Amerock; #9765
EpcO; No. EP591

2.3.4 Drawer Slides - Heavy Duty Drawers: Full extension type plus 1 inch, all ball bearing, rail mount, hold-in detent. For drawers 24 inches wide or less, provide slides with a 150-pound capacity. For drawers over 24 inches in width provide slides with 200-pound capacity. For drawers 42 wide or less, provide slides with up to 400-pound capacity. Acceptable manufacturer, or equal:

Accuride

2.3.5 File Drawer Slides: Heavy duty, full extension, 3-section slide, 1/2-inch slide space, 200-pound load capacity. Acceptable manufacturers or equal:

Accuride

Hafele

Knape & Vogt

2.3.6 File Drawer Track and Follower: K&V 476T ZC and K&V 476F ZC.

2.3.7 Adjustable Shelf Standards: Acceptable products or equal:

Knape & Vogt; No. 255 x 256

Hafele

2.3.8 Door and Drawer Locks:

.1 Door and Drawer Locks: Olympus Lock 500DR (Door) and 600DW (Drawer) or Corbin Cabinet Lock 0737 (Door) and 0738 (Drawer). Door and drawer locks shall be of pin tumbler design and include working cylinder slides and forwardly removable cylinder to rekey without totally disassembling lock body and passed by ANSI Grade 1 testing.

.2 Cam locks shall be easily rekeyable pin tumbler with working top slide and retainer staple.

.3 Provide locks on all doors and drawers.

.4 Locks for doors and drawers shall be keyed alike for each room and master keyed.

.5 Metal Strike Plates: Provide cabinet door and drawer locks with metal strike plates to protect against particle board rip out.

2.3.9 Shelving Standards and Brackets for Wall Mounted Shelving: Provide aluminum shelf standards and brackets with satin finish, of sizes required for depth of shelves indicated. Acceptable products or equal:

Knape & Vogt; No. 80 x 180

Stanley Hardware Div.; No. 6783 x 6785

2.3.10 Hanger Rods: 1-1/16-inch minimum diameter stainless steel or polished chrome tubing. Acceptable manufacturer or equal:

Knape & Vogt

2.3.11 Screws: Straight shank double thread particle board screws.

2.3.12 Keyboard Tray: Fully concealed slides without rough or exposed edges; Acceptable manufacturer or equal:

Accuride; Cbergo Tray 200
Accuride; Cbergo Tray 300 (Deluxe)

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 General: Install work as specified in Architectural Woodwork Standards, Section 1 and provide a Certified Compliance Certificate for Installation as specified herein.

3.1.2 Install plumb, level, true and straight with no distortions. Shim as required using concealed shims. Scribe and cut for accurate fit.

3.1.3 Secure to ground, stripping, blocking with countersunk, concealed fasteners. Install without distortion so that doors and drawers fit openings and are accurately aligned.

3.1.4 Base Cabinets: Set cabinets straight, plumb, and level. Adjust sub-tops within 1/16 inch of a single plane. Fasten each individual cabinet to floor at toe space, with fasteners spaced 24 inches on center. Bolt continuous cabinets together. Secure individual cabinets with not less than 2 fasteners into floor, where they do not adjoin other cabinets.

.1 Where required, assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.

3.1.5 Wall Cabinets: Securely fasten to solid supporting material, not plaster, lath, or gypsum board. Anchor, adjust, and align wall cabinets as specified for base cabinets.

.1 Reinforcement of stud walls to support wall-mounted cabinets specified in appropriate section, but responsibility for accurate location and sizing of reinforcement shall be coordinated with applicable trade.

3.1.6 Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.1.7 Install finish hardware after all finish work has been completed. Inspect drilling operations for surface splinters or delaminations. Pieces bearing such imperfections will be rejected.

3.2 INSTALLATION OF TOPS:

3.2.1 Field Jointing: Where practicable, make in same manner as factory jointing using doweled, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted shop drawings, factory prepared so there is no project site processing of top and edge surfaces.

3.2.2 Fastening: Use concealed clamping devices for field joints, located within 6 inches of front, at back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints. Secure tops to cabinets with "Z" type fasteners or equal, using 2 or more fasteners at each front, end, and back.

3.2.3 Solid Surface Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

.1 Align adjacent solid surfacing material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.

.2 Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

.3 Secure backsplashes according to manufacturer's recommendations.

.4 Caulk space between backsplash and wall with sealant specified in Section 07 90 00.

3.2.4 Workmanship: Abut tops and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices. At joints in epoxy tops, use manufacturer's recommended adhesives and holding devices to provide joint widths not more than 1/16-inch-wide at any location, completely filled and flush with abutting edges.

.1 After installation, carefully dress joints smooth, remove surface scratches, clean and polish entire surface.

.2 Provide holes and cutouts as required for mechanical and electrical work.

.3 Provide scribe moldings for closures at junctures of top, curb and splash with walls as recommended by manufacturer for materials involved. Use chemical resistant, permanently elastic sealing compound where recommended by manufacturer.

3.2.5 Coordinate work with Divisions 22, 23, and 26 for Mechanical, Plumbing and Electrical work to be integrated into casework.

3.3 CLEAN-UP:

Take necessary action to keep this work clean and free of dirt, trash, obstruction and equipment, except that necessary for the proper completion of this work. Remove materials not used.

END OF SECTION

SECTION 07 0150 - PREPARATION FOR RE-ROOFING

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. Roof tear-off.
2. Removal of base flashings.
3. Roof replacement preparation.

- B. Related Requirements:

- C. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices. Work of this Section is affected by roof sheathing removal and replacement unit price.

1.3 DESCRIPTION OF WORK

- A. Re-roofing preparation Work consists of the following:

- a. Preparation for: Roof replacement.
- b. Existing Roof Type: Aggregate surfaced BUR.
- c. Existing Deck Type: Wood deck.
- d. Roof tear-off.
- e. Removal of base flashings.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.5 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Roof Tear-Off: Removal of existing membrane roofing system from deck.
- C. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.

1.6 QUALITY ASSURANCE

- A. Reroofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner; Owner's insurer if applicable; testing and inspecting agency representative; roofing system manufacturer's representative; deck Installer; roofing Installer including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing system tear-off and replacement including, but not limited to, the following:
 - a. Reroofing preparation, including membrane roofing system manufacturer's written instructions.
 - b. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
 - d. Structural loading limitations of deck during reroofing.
 - e. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect reroofing.

1.7 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations will not be disrupted. Provide Owner with not less than 48 hours' notice of activities that may affect Owner's operations.
 - 1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.
- B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

- D. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
- E. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 PREPARATION, GENERAL

- A. Pollution Control: Comply with environmental regulations of authorities having jurisdiction. Limit spread of dust and debris.
 - 1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 2. Remove debris from building roof by chute, hoist, or other device that will convey debris to grade level.
- B. Temporary Weather Protection: During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

3.2 ROOF TEAR-OFF

- A. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.
 - 1. Remove fasteners from deck.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of membrane roofing system.
- B. Roof Deck: If broken or loose fasteners that secure deck panels to one another or to structure are observed or if deck appears or feels inadequately attached, immediately notify Architect. Do not proceed with installation until directed by Architect.
 - 1. Deck Securement: Provide additional deck securement, if needed.
 - 2. Unsuitable Deck: If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify District. Do not proceed with installation until directed by District.

3.4 EXISTING BASE FLASHINGS

- A. Remove existing base flashings

3.5 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - 1. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

3.6 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by preparation for re-roofing operations. Return adjacent areas to condition existing before operations began.

END OF SECTION 07 0150

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SECTION 07 2100
BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Thermal and acoustical insulation within the building.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.1.3 Related Sections:

- .1 Roof insulation over wood roof decks is specified in Section 07 51 00.
- .2 Mineral wool firestopping insulation is specified in Section 07840.

1.2 REFERENCES:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
U.S. General Services Administration, Federal Specification (FS)
Underwriters Laboratories (UL)

1.3 DESCRIPTION OF INSULATION SYSTEMS:

1.3.1 Thermal insulation within wood framed exterior walls:

.1 Type: Fire resistant, kraft-foil faced mineral fiber batts or blankets except kraft faced batts or blankets may be used where insulation is fully concealed as defined in the International Building Code (IBC) Sec. 2602. (CBC 707.1)

.2 Thickness: As required to obtain an R-value of not less the R-11.

.3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

.4 Installation Method: Stapled to inside face of studs.

1.3.2 Thermal insulation within light gaged metal framed exterior walls:

.1 Type: Fire resistant, kraft-foil faced, mineral fiber, batts or blankets.

.2 Thickness: As required to obtain an R-value of not less the R-11.

.3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

.4 Installation Method: Taped to face of studs.

1.3.3 Thermal insulation within wood framed roof construction:

.1 Type: Fire resistant, kraft-foil faced, mineral fiber batts or blankets except aluminum foil faced mineral fiber batts or blankets may be used where insulation is fully concealed as defined in UBC Sec. 2602 (CBC Section 1510)

.2 Thickness: As required to obtain an R-value of not less the R-19.

.3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

.4 Installation Method: Stapled to inside face of joists or rafters.

1.3.4 Thermal insulation for furred exterior concrete and masonry walls:

.1 Type: Rigid polystyrene board, rigid polyurethane board, or foil faced, rigid mineral fiber board.

.2 Thickness: As required to obtain an R-value of not less the R-9.

.3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

.4 Installation Method: Held in place by Z- or T- shaped fasteners to face of concrete or masonry wall.

1.3.5 Sound retardant insulation within interior partitions:

.1 Type: Unfaced mineral fiber batts or blankets.

.2 Thickness: Not less than 2-3/4 inches.

.3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

.4 Installation Method: Friction fit between studs.

1.3.6 Sound retardant insulation over suspended ceilings:

.1 Type: Unfaced mineral fiber batts or blankets.

.2 Thickness: Not less than 2-3/4 inches.

.3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

.4 Installation Method: Friction fit between studs.

1.3.7 Sound retardant insulation on face of concrete and masonry walls:

.1 Type: Neoprene faced mineral fiber blankets.

- .2 Thickness: Not less than 1-1/2 inches.
- .3 Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- .4 Installation Method: Spindle anchors to inside face of wall.

1.4 SUBMITTALS:

1.4.1 Certificates of Conformance: Submit certificates from the manufacturer stating that materials meet the R-value and fire resistance and surface burning characteristics specified herein.

1.4.2 Samples: Submit samples of each type of spindle anchor proposed for use.

1.4.3 Manufacturer's Instructions: Submit the manufacturer's printed instructions for installing the spindle anchors for reference.

1.4.4 Submittal procedures and quantities are specified in Division 1.

1.5 REGULATORY REQUIREMENTS:

1.5.1 Fire Performance Characteristics: Where insulation is used within a fire rated wall assembly, provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, in accordance with methods specified below, by UL or other testing and inspecting agency acceptable to State Fire Marshal.

.1 Surface Burning Characteristics: International Building Code (IBC), Standard No. 8-1 or ASTM E 84.

.2 Fire Resistance Ratings: ASTM E 119.

.3 Combustibility: ASTM E 136.

1.5.2 Plastic foam insulation shall comply with the 2016 California Building Code (CBC) Sec. 2602.

1.5.3 Certificate: As required by CBC Title 24, post a certificate containing the building permit number and the insulation manufacturer's name, material identification and R-value and stating that the insulation has been installed in accordance with the plans and specifications.

1.6 DELIVERY, STORAGE AND HANDLING:

1.6.1 Deliver insulation to the site in unopened containers labeled with the manufacturer's name and brand designation and R-value rating.

1.6.2 Store insulation in a dry, well ventilated, water-tight enclosure providing protection from damage. Do not store plastic insulation where it will be exposed to sunlight or to sources of ignition.

1.7 SEQUENCING AND SCHEDULING:

- 1.7.1 Do not install insulation until construction has progressed to the point that inclement weather will not damage or wet the insulation material.
- 1.7.2 Install insulation after electric wiring, plumbing and other concealed work is in place.
- 1.7.3 Insulation shall not be closed in until it has been inspected and approved.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS:

2.1.1 Batt or Blanket Mineral Fiber Insulation: ASTM C 665, Types and Classes as listed below. Insulation shall be rated non-combustible when tested in accordance with ASTM E 136.

- .1 Flame Resistant Foil-Scrim-Kraft Faced Insulation: Type III, Class A.
- .2 Foil Faced Insulation: Type III, Class B.
- .3 Kraft Faced Insulation: Type II, Class C.
- .4 Unfaced Insulation: Type I.

2.1.2 Rigid and Semi-Rigid Mineral Fiber Insulation:

.1 Foil Faced Rigid Mineral Fiber Boards: ASTM C 612, Class 1, 1.5 pounds per cubic foot maximum density with flame resistant foil-scrim-kraft facing.

.2 Semi-Rigid, Semi-Refractory Rock Wool Fiber Insulation Boards: ASTM C 612, Class 1, having a melting point in excess of 2000 degrees F, a density of 4pounds per cubic foot, dark color and flame resistant foil-scrim-kraft facing. Acceptable products or equal:

Fibrex, Inc.; FBX 40
U. S. Gypsum Co.; Thermafiber CW-40

.3 Neoprene Faced Acoustical Insulation: Minimum 2.0 pounds per cubic foot, black neoprene coated glass fiber duct liner complying with FS HH-I-545, Type II. The coated material shall have a flame spread rating not to exceed 25 and a smoke developed rating not to exceed 50 when tested in accordance with ASTM E 84. Provide duct liner without manufacturer's logo or other information printed on the exposed face.

2.1.3 Polystyrene Board: ASTM C 578, Type I or II.

2.1.4 Polyisocyanurate Board: FS HH-I-1972/1, Class 2.

2.2 AUXILIARY INSULATING MATERIALS:

2.2.1 Spindle Anchors:

.1 Zinc-coated steel consisting of a perforated base plate with a projecting split prong of appropriate type and length to penetrate the full thickness of the insulation and be bent back flush with the insulation surface.

.2 Provide one safety washer with each clip fastener.

.3 Adhesive shall be capable of bonding spindle anchors securely to substrates indicated without damaging or corroding either insulation, anchors, or substrates. Adhesive shall have a bonding strength of 70 pounds per clip after a 3-day drying time at 70 degrees F and shall have a temperature range of minus 20 degrees to plus 225 degrees F.

.4 Fasteners: Acceptable products or equal:

Stic-Klip Mfg. Co.; Type A or B
Miracle Adhesives Corp.; Miracle Stuk-Ups
Goodloe E. Moore; Gemco or Tuff-Weld

2.2.2 Metal Furring Strips: Z-shaped members of not lighter than 25 gage steel with inner flange not less than 1-3/8 inches wide knurled to accept drywall screws; or an insulation systems consisting of factory grooved polystyrene insulation boards with serrated U-shaped metal furring channels. Acceptable factory grooved polystyrene insulation and serrated U-shaped metal furring channels system or equal:

W. R. Grace and Co.; Thermo-Stud
Dow Chemical Co.; TGIF

2.2.3 Fasteners: Fasteners shall be pneumatically driven fasteners, powder actuated fasteners or concrete stud nails. Fasteners shall be of sufficient length to penetrate at least 1 inch into the masonry substrate.

2.2.4 Duct Tape: As recommended by the insulation manufacturer.

2.2.5 Wire Mesh: Wire mesh shall be hexagonal zinc-coated steel poultry netting having a 1-1/2 inch mesh size and 0.048 inch diameter (18 gage) wire, conforming to ASTM A 390.

2.2.6 Line Wires: Soft annealed steel with light zinc coated finish not lighter than 16 gage.

PART 3 - EXECUTION

3.1 INSTALLATION OF BATT INSULATION:

3.1.1 Install batt insulation in accordance with the manufacturer's recommendations. Install insulation the full height of the walls and between framing members as indicated.

3.1.2 Fully insulate all small areas between closely spaced framing members.

3.1.3 End match neatly with ends fitting snugly or overlapped.

3.1.4 Insulation shall be continuous behind all pipes, lighting switches, convenience outlet boxes, etc. Where pipes are installed in spaces to receive insulation, place insulation between exterior wall and the pipe, compressing insulation if necessary.

3.1.5 Kraft and Foil Faced Blankets: Where possible, recess foil faces 3/4 inch from face of framing members. Tape flanges to metal framing members. Maintain kraft or foil facings intact or patch all tears or holes using plastic tape or other approved means.

.1 Between Wood Framing Members: Where insulation is cut to fit small or irregular spaces, form flanges for attachment to framing members. Insert flanged blankets between framing members with facing toward the building interior. Staple flanges to wood framing members at the end of each blanket and not more than 6 inches apart between ends.

.2 Between Metal Framing Members: Size insulation to fit tightly between light gage metal framing. Where insulation is cut to fit small or irregular spaces, cut the insulation slightly larger than the space to ensure a tight friction fit. Insert blankets between the studs from the inside face of the wall, recessed slightly from the face of the studs. Where blankets are not adequately supported by friction, attach the blankets with tape, adhesive, 9/16 inch long divergent point staples located at four corners and center of each blanket, or tie wires spaced not more than 36 inches on center.

.3 To Concrete or Masonry Walls Deck: Cut insulation to cover walls. Apply adhesive to the wall and set clip fasteners in adhesive. Space fasteners as recommended by the insulation manufacturer. After curing of adhesive, install insulation over fasteners and bend the split prongs flush with the insulation to secure. Butt all edges of insulation and seal edges with tape.

.4 To Underside of Concrete or Metal Deck: Cut insulation to fit between structural steel framing and to completely cover underside of floor decks. Weld clip fastener to underside of metal deck. Apply adhesive to the underside of concrete deck and set clip fasteners in adhesive as recommended by the insulation manufacturer. Space fasteners in accordance with the insulation manufacturer's recommended pattern but not to exceed one fastener for each 4 square feet of insulation. After curing of adhesive, install insulation over fasteners and bend the split prongs flush with the insulation to secure. Butt all edges of insulation and seal edges with tape.

3.1.6 Unfaced Batts and Blankets: Where insulation is cut to fit small or irregular spaces, cut the insulation slightly larger than the space to ensure a tight friction fit. Insert blankets between the studs from the inside face of the wall, recessed slightly from the face of the studs. Where blankets are not adequately supported by friction, attach the blankets with adhesive, 9/16 inch long divergent point staples located at four corners and center of each blanket, or with tie wires spaced not more than 36 inches on center.

3.2 INSTALLATION OF SEMIRIGID INSULATION:

3.2.2 Install insulation blankets with minimum 1 inch space between face of insulation and the spandrel panels using the spindle anchors spaced 12 inches on center both ways.

3.2.3 Acoustical Insulation for Surface Application: Install insulation on surface of masonry walls and underside of concrete slab or metal deck with clip fasteners glued or welded to the substrate and spaced not more than 12 inches on center each way.

3.3 INSTALLATION OF RIGID INSULATION SYSTEM:

3.3.2 General: Install rigid insulation board of the thickness indicated by one of the following methods on interior side of exterior concrete and masonry walls where indicated.

3.3.3 Installation Using Z-Shaped Furring Channels: Erect insulation vertically and hold in place with Z-shaped furring channels spaced 24 inches on center. Except at exterior corners, attach narrow flanges of furring channels to the wall with concrete stub nails, power driven fasteners or pneumatically driven fasteners spaced 24 inches on center. At exterior corners, attach wide flange of furring channel to the wall with the short flange extending beyond the corner. Start from this furring channel with a 3 inch strip of insulation followed by a furring channel installed in the normal manner. At interior corners, place one channel at the corner with a second channel no more than 12 inches from the corner and cut insulation to fit. Hold insulation in place until gypsum board is installed using 10 inch staples field fabricated from 18 gage tie wire and inserted through a slot in the channel. Apply wood blocking around door and window openings and as required for support of fixtures and furnishings. Cut insulation boards as necessary to fit around windows, doors and electrical conduit.

3.3.4 Installation Using U-Shaped Furring Channels: Install the insulation board beginning at one corner with each board butted tightly to form an uninterrupted surface. Cut and fit the board as necessary to accommodate doors, windows and electrical conduit. Position the U-shaped channels in one of the pregrooved areas of the board beginning at the corner. Space studs not more than 24 inches on center. Press the back of the channel nearly flush with the face of the insulation board. Position additional channels around windows and door openings and at outside corners as necessary to provide firm attachment for the gypsum drywall. Drive hardened concrete nails or pneumatically driven fasteners through the channel and insulation board and not less than 1 inch into the substrate. Space fasteners not more than 24 inches on center.

END OF SECTION

SECTION 07 2200 – ROOF INSULATION

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Rigid roof insulation over wood roof decks.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as if fully repeated herein.

1.2 REFERENCE STANDARDS:

The editions of specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
General Services Administration Federal Specifications (Fed. Spec.)

1.3 SUBMITTAL:

1.3.1 Shop Drawings: Submit drawings for tapered insulation systems showing the layout and code marking of panels and indicating roof slopes, cants, crickets and roof drain locations.

1.3.2 Product Data: Submit certificates of conformance, certified test reports or other data indicating conformance of insulation with the applicable reference standards.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Manufacturer's Qualifications: Use only insulation materials acceptable to the built-up roofing system manufacturer.

1.4.2 Regulatory Requirements:

.1 UL Listing: Provide insulation materials that have been listed by Underwriters Laboratories, Inc. (UL) as approved for use in construction of Class A roof coverings.

.2 Provide insulation materials used over metal deck listed by Underwriters Laboratories or Factory Mutual as part of a roof deck construction that has been evaluated for spread of fire on the underside and for wind uplift of Class I-60.

.3 Complying with Title 24: Roof insulation needs to R-38 or better.

1.4.3 Pre-Installation Conference: The roof insulation installer, as a part of the complete roofing system installation, shall participate in the Pre-Roofing Conference as specified in Section 07 5100.

1.4.4 Where insulation is a component of a guaranteed roofing system as specified in Section 07 5100, provide insulation as manufactured by the roofing system manufacturer, or approved by him for use in the guaranteed roofing system. Installer shall be the same installer as used for the roofing system and approved by the roofing materials manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Delivery

.1 Deliver insulation and asphalt to the site in unopened containers labeled with the manufacturer's name and brand designation.

.2 Package and code tapered insulation boards to match codes used on the shop drawings.

1.5.2 Storage:

.1 Do not store insulation in the building until masonry, plaster and concrete are dry and the building has reached the prevailing relative humidity of the locality.

.2 Store insulation elevated off the ground in dry weather-tight enclosures or under weather-tight tarpaulins. Provide adequate ventilation to avoid condensation.

1.6 PROJECT CONDITIONS:

1.6.1 Do not apply insulation when the ambient temperature is below 40 degrees F or when conditions indicate that temperature may fall below 40 degrees F within 24 hours.

1.6.2 Do not apply insulation when there is surface moisture or visible dampness on the roof deck.

PART 2 - PRODUCTS

2.1 INSULATION:

2.1.1 Materials:

.1 Expanded Perlite Board: ASTM C 728-91.

.2 Polyisocyanurate Board: Fed. Spec. HH-I-1972/2, except that compressive strength shall be not less than 20 psi.

.3 Tapered Insulation: Polyisocyanurate insulation as specified above, factory tapered to provide slopes as indicated.

.4 Glass Fiber Board: ASTM C 726-93.

.5 Composite Board: Fed. Spec. HH-I-1972/3, Style 1 or 2 or Fed. Spec. HH-I-1972/5.

.6 Wood Fiber Board: ASTM C 208-95.

2.1.2 Thickness of Insulation: Sufficient to provide a thermal resistance rating (R-

value) of R-38 or better, except thickness shall be not less than that recommended by the insulation manufacturer to span the flutes in the metal roof deck.

.1 Tapered Insulation: Provide tapered insulation of thickness required to obtain an R-value of R-38 or better average over the entire deck. .

2.2 OTHER MATERIALS:

2.2.1 Asphalt Primer: Meet the requirements of ASTM D 41-94.

2.2.2 Asphalt: Steep slope asphalt meeting the requirements of ASTM D 312, Type III or IV.

2.2.3 Asphalt Roof Cement: Meet the requirements of ASTM D 2822, Type I.

2.2.4 Cants and Tapered Edge Strips: Expanded perlite meeting the requirements of ASTM C 728 or pressure preservative treated wood as specified in Section 06 100.

3.1 EXAMINATION:

3.1.1 Examine deck substrates to ensure that the following conditions are met:

.1 The deck is properly sloped to drain without hollows or low spots exceeding 1/4 inch in 10 feet.

.2 Curbs and cants are in place and properly installed.

.3 Nailers the same thickness as insulation have been provided at eaves, edges, curbs, walls, and roof openings for securing cant strips, gravel stops, gutters, and flashing flanges.

.4 Work that requires penetration of the deck has been completed.

.5 Joints between deck units are properly grouted and leveled to provide suitable surfaces for the installation of insulation.

3.1.2 Do not proceed with installation of insulation until such deficiencies have been corrected.

3.2 PREPARATION OF SURFACES:

3.2.1 Sweep deck surfaces to remove all loose particles and debris.

3.2.2 Protection:

.1 Locate flame heated equipment so as not to endanger the structure, other materials on the site or adjacent property.

.2 Do not place flame heated equipment on the roof of any structure.

.3 Provide and maintain fire extinguishers near flame heated equipment.

.4 Install protective coverings over paving and building walls adjacent to hoists and kettles before starting work.

3.3 APPLICATION OF ASPHALT:

The temperature range of the asphalt at the carrying bucket when the bitumen is removed from the kettle shall be within 25 degrees F above to 25 degrees F below the equiviscous temperature (ETV). If the temperature within the kettle exceeds the finish blowing temperature (FBT) drain the asphalt from the kettle and dispose of it off site.

3.4 APPLICATION OF INSULATION:

3.4.1 Install roof insulation in not less than 2 layers with joints of each succeeding layer parallel and offset in both directions with respect to the layer below.

3.4.2 Apply only as much insulation as can be completely covered with roofing on the same day. At the end of each day's work, seal the edges of the insulation with 18 inchwide strips of felt adhered with either hot asphalt or plastic roof cement to both the deck and the completed roof membrane. Remove these strips before continuing application of insulation.

3.4.3 First Layer on Concrete Decks: Install first layer of insulation board directly to the concrete roof deck in a mopping of hot asphalt applied at the rate of 25 pounds per 100 square feet.

3.4.4 First Layer on Metal Decks: Apply first layer of insulation board directly to the metal deck and secure it to the deck with fasteners spaced as recommended by the manufacturer to meet Underwriters Laboratories or Factory Mutual I-60 wind uplift requirements. Insulation joints parallel to ribs of deck shall occur on solid surfaces only, not over open ribs.

3.4.5 Subsequent Layer(s): Install additional layer(s) of insulation board as necessary to achieve the specified C-value or thickness. Apply insulation in a mopping of hot asphalt applied at the rate of 25 pounds per 100 square feet.

3.4.6 Built-up bituminous roofing shall not be applied directly to polyisocyanurate or phenolic foam insulation. Such insulations shall be covered with a layer of perlite, glass fiber, or wood fiber board not less than 1/2 inch thick.

END OF SECTION

SECTION 07 5423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

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. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Roof insulation.
3. Cover board.
4. Walkways.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 06 1600 "Sheathing" for wood-based, structural-use roof deck panels.
3. Section 07 2100 "Thermal Insulation" for insulation beneath the roof deck.
4. Section 07 6200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
5. Section 07 7129 "Manufactured Roof Expansion Joints" for manufactured roof expansion-joint assemblies.
6. Section 07 9200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site

1. Meet with Owner, Architect, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 1. Layout and thickness of insulation.
 2. Base flashings and membrane termination details.
 3. Flashing details at penetrations.
 4. Tapered insulation layout, thickness, and slopes.
- C. Samples for Verification: For the following products:
 1. Roof membrane and flashings, of color required.
 2. Walkway pads or rolls, of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer
- B. Manufacturer Certificates:
 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

- C. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field quality-control reports.
- F. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes roof membrane, base flashings, fasteners, substrate board, roof pavers, and other components of roofing system.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
 - 1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
 - 1. Fire/Windstorm Classification: Class 1A-90
- E. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low slope roof products.
- F. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
- G. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- H. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D 6878/D 6878M, internally fabric- or scrim-reinforced, fabric-backed TPO sheet.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. GAF.
 - d. Johns Manville; a Berkshire Hathaway company.
Or equal.
 - 2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
 - 3. Thickness: **80 mils** nominal.
 - 4. Exposed Face Color: Gray

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 80 mils thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Roof Vents: As recommended by roof membrane manufacturer.
 - 1. Size: Not less than 4-inch diameter.
- E. Bonding Adhesive: Manufacturer's standard, water based.
- F. Slip Sheet: Manufacturer's standard, of thickness required for application.
- G. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

- I. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum board or ASTM C 1278/C 1278M, fiber-reinforced gypsum board.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Thickness: Type X, 5/8 inch thick.
 3. Surface Finish: Factory primed
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.5 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads/rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
 1. Size: Approximately 36 by 60 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
 4. Verify adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch at top surface.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 - 1. Submit test result within 24 hours after performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.

3.4 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
 - 1. Tightly butt substrate boards together.
 - 2. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

3.5 INSTALLATION OF COVER BOARDS

- A. Install slip sheet over cover board and beneath roof membrane.

3.6 ADHERED ROOFING INSTALLATION

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel

- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

- A. Flexible Walkways:
 - 1. Install flexible walkways at the following locations:

- a. Retain one or more subparagraphs below. Revise to suit Project.
 - b. Perimeter of each rooftop unit.
 - c. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - d. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - e. Top and bottom of each roof access ladder.
 - f. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - g. Locations indicated on Drawings.
 - h. As required by roof membrane manufacturer's warranty requirements.
- 2. Provide 6-inch clearance between adjoining pads.
 - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

Testing Agency: Engage a qualified testing agency to perform tests and to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner: <Insert name of Owner>.
 2. Address: <Insert address>.
 3. Building Name/Type: <Insert information>.
 4. Address: <Insert address>.
 5. Area of Work: <Insert information>.
 6. Acceptance Date: _____.
 7. Warranty Period: <Insert time>.
 8. Expiration Date: _____.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work

covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 07 5423

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: This section includes furnishing and installing of all flashing and sheet metal work indicated and specified, complete.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
U.S. General Services Administration Federal Specifications (FS)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit shop drawings of fabricated items showing layout, profiles, methods of joining, and anchorage details, including reglets, counterflashings, and gutters.

1.3.2 Product Data: Submit manufacturer's product data, installation instructions and general recommendations for each fabricated product.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

Pre-application Conference: Before starting application of the roofing, hold a conference with representatives of the applicators and materials manufacturers of both the insulation and built-up roofing systems, the sheet metal installer, the roofing accessories installer, the mechanical and electrical equipment installers, the Contractor, the testing laboratory, the Architect and the Owner in attendance. The conference shall assure a clear understanding of the drawings and specifications, resolve possible conflicts and establish coordination between all parties involved.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Delivery: Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition.

1.5.2 Storage: Store materials in dry, weather-tight, ventilated areas until immediately before installation.

1.5.3 Handling: Handle sheet metal items to avoid damage to surfaces, edges, and ends.

1.6 COORDINATING AND SCHEDULING:

Secure field measurements required for proper and adequate fabrication and installation of the work. Coordinate sheet metal work related to roofing work with the roofing installer.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Galvanized Sheet Metal: Galvanized iron or steel sheet, ASTM A 653, with minimum zinc coating of 1.25 ounces per square foot and 0.2 percent copper bearing.

2.1.2 Stainless Steel Sheet Metal: Meet the requirements of ASTM A 167, Type 302 or 304, finish 2d or as indicated, fully annealed, dead soft temper.

2.1.3 Copper Sheet Metal: Meet the requirements of ASTM B 152 and B 370, [16] [20] ounce sheet unless otherwise indicated. Bar stock used in conjunction with sheet material shall be of a compatible alloy.

2.1.4 Aluminum Sheet Metal: ASTM B 209, 3003-H14 alloy and temper.

2.1.5 Zinc Alloy Sheet Metal: Zinc-copper-titanium alloy conforming to Fed. Spec QQ-Z-100.

2.1.6 Lead: ASTM B 749, Type L51121, copper-bearing sheet lead, minimum 4 pounds per square foot, except not less than 6 pounds per square foot for welding, unless otherwise indicated.

2.1.7 Solder:

.1 Solder for Use With Galvanized Steel, Zinc Alloy, or Copper Sheet Metal: ASTM B 32, 50-50 tin/lead solder, with rosin flux.

.2 Solder for Use With Stainless Steel: ASTM B 32, 60-40 tin/lead solder with acid-chloride type flux, except use rosin flux over tinned surfaces.

2.1.8 Butyl Sealer: Where it is impracticable to use a solder at joints and corners, seal with a butyl sealant. Acceptable products or equal:

Adco Seal; No. B-100
PTI Sealants; No. 707
Tremco; Butyl Sealant

2.1.9 Fasteners: Same metal or a metal compatible with the items it contacts. Use stainless steel fasteners to fasten dissimilar materials. Provide compatible washers where required to protect surface of sheet metals and to provide a watertight connection.

.1 Nails: Use case-hardened concrete nails over concrete and roofing nails over wood, of required lengths.

.2 Rivets: Pop rivets.

.3 Sheet Metal Screws: Self-drilling type, of proper size and material to suit conditions. Where wood nailers are provided, use galvanized or stainless steel wood screws as applicable.

2.1.10 Paper Slip Sheet: 5 pound rosin-sized building paper.

2.1.11 Waterproofing Sheet Underlayment: Minimum 35 mil thick aluminum foil backed, synthetic rubber based self-adhering sheet. Acceptable products or equal:

Polyken Technologies/Kendall Co.; Polyken 626 Foilastic
Protecto Wrap Co.; Fast Flash

2.1.12 Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive.

2.1.13 Reglet and Counterflashing Assembly: Fabricate of 24 gage galvanized steel sheet metal or 0.055 inch extruded aluminum. Acceptable products or equal:

Fry Reglet Corp.; Fry Springlock Flashing System Type ST
MM Systems Corporation; Snap-Tite RC-2
Dayton Superior Corp.; F-101

2.1.14 Non-Shrink Grout: Premixed, nonmetallic, non-corrosive, non-staining grouting compound containing silica sands, portland cement, shrinkage compensating agents and water reducing agents, meeting the requirements of ASTM C 1107. Acceptable products or equal:

Gifford Hill & Co., Inc.; Supreme
Master Builders; Masterflow 713
The Upco Company; Upcon Nonshrink

2.1.15 Modified Bitumen Flashing Cement: Two component elastomeric compound. Acceptable products or equal:

Johns Manville; MBR Flashing Cement Base
Celotex Roofing Products Division; SBS Modified Flashing Adhesive

2.2 FABRICATION:

2.2.1 General: Shop-fabricate work to greatest extent possible. Fabricate sheet metal work in accordance with the SMACNA "Architectural Sheet Metal Manual", Latest Edition, unless otherwise indicated. Fabricate for waterproof and weather-resistant performance, with expansion provisions. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels, with exposed edges folded back to form hems.

2.2.2 Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder. Form aluminum seams with seam sealer; rivet joints for additional strength where required.

2.2.3 Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION:

3.1.1 Examine surfaces against which sheet metal is to be placed to ensure that they are smooth, clean and free of defects.

3.1.2 Check base flashings to ensure that they extend at least 9 inches above the toe of cant and are securely fastened to the structure.

3.1.3 Do not start work until deficiencies have been corrected. Start of work of this section constitutes acceptance of the surfaces.

3.2 INSTALLATION:

3.2.1 Workmanship: Install sheet metal straight and true, with miters and joints accurately fitted, exposed work free of dents. Reinforce corners and make seams waterproof. Make provisions for expansion and contraction in sheet metal assemblies. Anchor work securely in place, conceal fasteners where possible.

3.2.1.1 Install flanges of sheet metal items on top of last roofing ply in full bed of asphaltic plastic cement 1/8 inch thick.

3.2.2 Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a ship sheet of red rosin paper and a course of polyethylene underlayment.

3.2.3 Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by fabricator.

3.2.4 Soldering: Pre-tin edges of sheet metal before soldering. Solder slowly with heavy, well-heated, properly tinned coppers, to heat the seam thoroughly and completely sweat the solder through the full width of the seam. Use ample solder which results in the seam showing not less than 1 inch of evenly flowed solder. Solder immediately after application of flux. Upon completion of soldering, neutralize acid and thoroughly clean surfaces.

3.2.5 Hanging Gutters: Fabricate of 24 gage galvanized steel, unless otherwise indicated. Lap joints between sections 1-1/2 inches, rivet and solder. Provide loose locked expansion joints midway between outlet tubes to provide for 1-1/2 inch movement in both directions. Provide expansion joints with cover strips in a manner to provide free movement and watertight connection. Form outlet tubes of same material and thickness as gutter and lock and solder the longitudinal seam. Flange the upper end of tubes and rivet and solder to the lining. Extend tubes into downspouts at least 3 inches. Provide outlets with tight fitting wire ball strainers. Support gutters with 20 gage strap hangers and install spreaders at midpoint between hangers.

3.2.6 Edge Strips: Fabricate strips of galvanized steel of the same thickness as metal to be fastened. Secure edge strips in place at not more than 6 inches on center.

3.2.7 Reglets and Counterflashings: Install reglets and counterflashings in accordance with the manufacturer's printed installation drawings and instructions and indicated.

3.2.8 Flashing at Equipment Supports: Fabricate cap flashing of 24 gage galvanized steel unless otherwise indicated. Turn bottom 1/2 inch of exposed edges outward at a 45 degree angle and hem on the underside. Install with joints between sections lapped 3 inches and sealed with sealant. Maintain bottom of flashing at least 1 inch above top of cant.

3.2.9 Scupper Linings: Cover wood surfaces to receive scupper liner with one layer of waterproofing sheet underlayment. Unless otherwise indicated, line scuppers with 22 gage

galvanized steel extending through the walls and projecting into conductor heads. Join scupper linings to wall and roof flanges with locked and soldered seams. Prime masonry surfaces to receive the scupper lining and coat with plastic cement.

3.2.10 Downspouts: Fabricate downspouts of 24 gage galvanized steel unless otherwise indicated. Telescope end joints 1-1/2 inches and lock longitudinal joints. Hold downspouts in position 1 inch clear of the wall with 1/16" by 1" galvanized steel downspout straps spaced not more than 10 feet on center and securely fasten to the wall with expansion anchors.

3.2.11 Roof Drain Flashings: Roof drains are specified in Division 23. Provide a 30 inch square 2-1/2 pound lead sheet with cutout to fit into drain flashing ring. Set flashing sheet over the top roofing ply in a full bed of plastic cement. Strip-in flashing over lead sheet is specified in Section 07 60 00.

3.2.12 Flashing at Roof Penetrations:

.1 Provide metal flashing for all pipes, ducts, conduits, equipment supports, and vent stacks projecting through the roof surface as indicated and required.

.2 Miscellaneous Flashings and Metal Trim: Miscellaneous flashings, metal trim, and their related components are not necessarily individually described. Furnish miscellaneous items and trim not mentioned or described in accordance with the intent of the drawings and specifications and as required to complete the work.

3.3 SHOP PAINTING:

Treat sheet metal surfaces which will be concealed in the finished work with an approved acid wash and then shop paint with one coat of an approved galvanized primer such as zinc dust-zinc oxide primer. Sheet metal surfaces which will be exposed in the finished work are specified to be treated and prime-painted under Section 09 90 00.

END OF SECTION

ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Roof access hatches.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of American Society for Testing and Materials (ASTM) standards referenced herein apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

1.3 SUBMITTALS:

1.3.1 Product Data: Submit manufacturer's standard technical product data, rough-in diagrams, details, installation instructions and general product information. Data shall show thickness, type, grade, and class of materials; dimensions; details of construction and installation details.

1.3.2 Installation and Maintenance Instructions: Submit manufacturer's instructions for installation and operation of roof hatch assemblies.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 DELIVERY, STORAGE AND HANDLING:

1.4.1 Delivery: Assemblies shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness and wet storage stains upon delivery to the job site.

1.4.2 Storage and Handling: Do not uncrate assemblies until they are ready for use. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Zinc Coated Steel Sheet: ASTM A 653, commercial quality with 20 percent copper, coating designation G90, mill phosphatized.

2.1.2 Aluminum Sheet: ASTM B 209, alloy and temper as best suited for the purpose, mill finish.

2.1.3 Insulation Board: Rigid or semi-rigid glass fiber board.

2.2 ROOF HATCHES:

2.2.1 Galvanized Steel Roof Access Hatches: Ladder type designed to support an external loading of 40 psf and an internal loading of 20 psf. Acceptable products or equal:

Babcock-Davis Hatchways, Inc.; Model 6-102
The Bilco Company; Model S-20
Dur-Red Products; Model LH-G

.1 Cover: Form of 0.079 inch (14 gage) galvanized steel with 3 inch beaded flange, neatly welded. Insulate with 1 inch thick fiberglass, fully covered and protected by a 0.034 inch (22 gage) galvanized steel cover liner.

.2 Curb: Form of (0.079 inch (14 gage) galvanized steel 12 inches high, formed with a 3-1/2 inch flange, with holes provided for securing to the roof deck. Equip curb with an integral metal capflashing of the same material as the curb, fully welded at the corners for weather-tightness. Insulate the curb with 1 inch thick rigid fiber board.

.3 Hardware: Heavy pintle hinges, enclosed spring or pneumatic operators, positive snap latch with turn handles and padlock hasps inside, and neoprene draft seal. Equip cover with an automatic hold-open arm, complete with red vinyl grip handle to permit easy, one hand release. Provide hardware with cadmium plated finish.

.4 Finish: Factory finish with manufacturer's standard prime coat for final painting as specified in Section 09 90 00.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates, and with roof insulation, roofing and flashings. Anchor units securely to supporting structural substrates.

3.1.2 Roof Hatches: Install roof hatches in accordance with the manufacturer's recommendations. Attach flanges to wood decking or nailers with minimum 3/8 inch diameter lag screws.

.1 Isolation: Where metal surfaces of units are to be installed in contact with noncompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces.

.2 Flange Seals: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.

3.2 CLEANING AND ADJUSTING:

3.2.1 Operational Units: Test and operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.2.2 Clean exposed metal and plastic surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION

FIRESTOPPING

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 firestopping for through-penetrations through the following fire-resistance rated assemblies, including both blank openings and openings containing penetrating items:

- 1. Floor-ceiling assemblies.
- 2. Roof-ceiling assemblies.
- 3. Walls and partitions.

- B. Related Sections include the following:

- 1. Division 7 – Section 07 90 00 – Joint Sealers
- 2. Division 9 – Section 09 25 00 – Gypsum Board
- 3. Division 28 – Section 28 31 00 – Fire Alarm System
- 4. Division 21 – Section 21 13 13 – Fire Sprinkler System
- 5. Mechanical Drawings – Mechanical Insulation
- 6. Mechanical Drawings – Plumbing
- 7. Division 26 – Section 26050 – Basic Electrical Materials and Methods

1.3 PERFORMANCE CRITERIA

A. FIRE TEST REQUIREMENTS

- 1. Underwriters Laboratories, Inc. (UL):
 - a. ANSI/ UL1479, “Fire Tests of Through Penetration Firestops”.
 - b. ANSI/ UL2079, “Tests for Fire Resistance of Building Joint Systems”.
 - c. ANSI/ UL263, “Fire Tests of Building Construction and Materials”.
 - d. ANSI/ UL723, “Surface Burning Characteristics of Building Materials”.
- 2. American Society of Testing and Materials (ASTM):
 - a. ASTM E-814, “Fire Tests of Through Penetration Fire Stops”.
 - b. ASTM E-1966, “Test Method for Fire Resistive Joint Systems”.
 - c. ASTM E-119, “Fire Tests of Building Construction and Materials”.
 - d. ASTM E-84, “Surface Burning Characteristics of Building Materials”.

B. REFERENCES

1. Underwriters Laboratories (UL) of Northbrook, IL "Fire Resistance Directory".
 - a. Through Penetration Firestop Systems (XHEZ)
 - b. Joint Systems (XHBN)
 - c. Fill, Void or Cavity Materials (XHHW)
 - d. Firestop Devices (XHJI)
 - e. Forming Materials (XHKU)
 - f. Wall Opening Protective Materials (CLIV)
2. All major building codes:
 - a. International Building Code published by ICC
 - b. California Building Code (CBC) 2016 Edition.
3. National Fire Protection Association (NFPA) of Quincy, MA "NFPA 101: Life Safety Code".
4. National Fire Protection Association (NFPA) of Quincy, MA "NFPA 70: National Electrical Code".
5. Factory Mutual Approvals (FM) of Norwood, MA "FM 4991: Standard for Approval of Firestop Contractors".

C. PERFORMANCE REQUIREMENTS

1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
2. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
3. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
4. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.
5. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.
6. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words "Chase Wall Optional".

7. Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.
8. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standards, ASTM E-1399, ASTM E-1966 or ANSI/ UL 2079.
9. Provide fire-resistive joint systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL2079 with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.
10. Pipe insulation shall not be removed, cut away, or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
11. Provide T-Rating Collar Devices tested in accordance with ASTM E 814 or ANSI/UL1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.

1.4 SUBMITTALS

- A. Product Data: For each type of firestopping product indicated.
- B. System Drawings: Submit documentation from a qualified third-party testing agency that is applicable to each firestopping system configuration for construction, joint opening width and/or penetrating items.
- C. Product Certificates: Certificate of conformance signed by manufacturers of firestopping products certifying that products comply with requirements.
- D. Submittal procedures and quantities are specified in Division 1.

1.5 QUALITY ASSURANCE

- A. Provide firestopping systems that comply with the following requirements and those specified in "Performance Criteria" Article:
 1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 2. Firestopping products bear classification marking of qualified testing and inspection agency.
- B. Engage an experienced installer who is certified, licensed, FM Approved in accordance with FM 4991 or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its firestopping products to

Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

- C. Obtain firestop systems for each type of penetration or joint opening and construction condition indicated from a single manufacturer.
- D. Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings".

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.
- B. Store and handle materials for firestopping products to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.

1.7 PROJECT CONDITIONS

- A. Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.
- B. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.
- C. Do not use materials that contain flammable solvents.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration firestop systems.
- C. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 – PRODUCTS

2.1 FIRESTOPPING, GENERAL

- A. Provide firestopping products that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by firestopping products manufacturer based on testing and field experience.

- B. Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.2 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through-penetration firestop systems (XHEZ) and/or joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
 - 1. Specified Technologies, Inc. (STI), Somerville, New Jersey
800 – 992 – 1180
 - 2. Other manufacturers listed in the UL Fire Resistance Directory – Volume 2.

2.3 MATERIALS

- A. General: Use only firestopping products that have been tested for specific fire-resistance-rated construction conditions conforming to construction assembly type, penetrating item type or joint opening width and movement capabilities, annular space requirements, and fire-rating involved for each separate instance.
- B. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSS Intumescent Sealant
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series LCI Intumescent Sealant
 - 3. Specified Technologies, Inc. (STI) SpecSeal Series LC Endothermic Sealant
 - 4. Specified Technologies, Inc. (STI) SpecSeal Series AS Elastomeric Spray
 - 5. Specified Technologies, Inc. (STI) SpecSeal Series ES Elastomeric Sealant
- C. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSC Firestop Collars
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series LCC Firestop Collars
- D. Fire Rated Cable Pathways: STI EZ-PATH™ Brand device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:
 - 1. Specified Technologies Inc. (STI) EZ-PATH™ Fire Rated Pathway

- E. Wall Opening Protective Materials: Intumescent, non-curing pads or inserts for protection of electrical switch and receptacle boxes to reduce horizontal separation to less than 24", the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSP Firestop Putty Pads
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series EP PowerShield Insert Pads
- F. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSP Firestop Putty
- G. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series RED Wrap Strip
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series BLU Wrap Strip
- H. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSB Firestop Pillows
- I. Mortar: Portland cement based dry-mix product formulated for mixing with water at Project site to form a non-shrinking, water-resistant, homogenous mortar, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSM Firestop Mortar
- J. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag), the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) Pensil 300 Silicone Sealant
 - 2. Specified Technologies, Inc. (STI) Pensil 300 SL Self-Leveling Silicone Sealant
- K. Silicone Foam: Multicomponent, silicone-based liquid elastomers, that when mixed, expand and cure in place to produce a flexible, non-shrinking foam, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) Pensil 200 Silicone Foam
- L. Cast-In-Place Firestop Device: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket, the following products are acceptable:

1. Specified Technologies, Inc. (STI) Spec-Seal CD Cast-In Firestop Device
- M. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts, the following products are acceptable:
1. Specified Technologies, Inc. (STI) SpecSeal FyreFlange Firestop Angles
- N. Firestop Plugs: Re-enterable, foam rubber plug impregnated with intumescent material for use in blank openings and cable sleeves, the following products are acceptable:
1. Specified Technologies, Inc. (STI) SpecSeal Series FP Firestop Plug
- O. Fire Rated T Rating Collar Device: Louvered steel collar system with synthetic aluminized polymer coolant wrap installed on metallic pipes where T Ratings are required by applicable building code requirements, the following products are acceptable:
1. Specified Technologies, Inc. (STI) SpecSeal T-Collar Device
- P. Fire-Rated Cable Grommet: Molded two-piece grommet made from plenum grade polymer with a foam inner core for sealing individual cable penetrations up to 0.27 in. (7mm) diameter, the following products are acceptable:
1. Specified Technologies, Inc. (STI) Ready Firestop Grommet

PART 3 – EXECUTION

3.1 PREPARATION

- A. Examination of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.
- C. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
- D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 FIRESTOPPING INSTALLATION

- A. General Requirements: Install through-penetration firestop systems and fire-resistive joint systems in accordance with “Performance Criteria” Article and in accordance with the conditions of testing and classification as specified in the published design.
- B. Manufacturer’s Instructions: Comply with manufacturer’s instructions for installation of firestopping products.

1. Seal all openings or voids made by penetrations to ensure an air and water resistant seal.
2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of through-penetration firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.
4. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition might occur such as the intersection of a gypsum wallboard/steel stud wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.
5. Where joint application is exposed to the elements, fire-resistive joint sealant must be approved by manufacturer for use in exterior applications and shall comply with ASTM C-920, "Specification for Elastomeric Joint Sealants".

3.3 FIELD QUALITY CONTROL

- A. Inspections: Owner shall engage a qualified independent inspection agency to inspect through-penetration firestop systems.
- B. Keep areas of work accessible until inspection by authorities having jurisdiction.
- C. Where deficiencies are found, repair or firestopping products so they comply with requirements.

3.4 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

END OF SECTION

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SECTION 07 8413 - PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Requirements:

1. Section 07 8443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, type of construction penetrated, kind of penetrating item, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: Manufacturer's certification that products furnished comply with requirements.
- C. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver penetration firestopping system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.
- B. Store and handle materials for penetration firestopping systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.
- C. Do not cover up penetration firestopping system installations that will become concealed behind other construction until Project Inspector has examined each installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics. Provide penetration firestopping systems that comply with the following requirements and those specified in "Penetration Firestopping Systems" Article:
 - 1. Perform penetration firestopping system tests by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestopping systems acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

- a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
- B. For penetration firestopping systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant penetration firestopping systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide penetration firestopping systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide penetration firestopping systems not requiring removal of insulation.

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Tremco, Inc.
 - d. Or Equal.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming / damming / backing materials, including the following:
 - a. Slag- / rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming / damming / backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Non-hardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant

additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping systems. Comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping system materials. Remove tape as soon as possible without disturbing firestopping system's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming / damming / backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

3.5 FIELD QUALITY CONTROL

- A. Inspection: The Project Inspector will inspect all penetration firestopping.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection has been completed and installation approved by the Project Inspector.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing FS-1:
 - 1. UL-Classified Systems: UL-W-L-5266.
 - 2. Rating: 1 hour.

END OF SECTION 07 8413

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Sealant work, except as otherwise specified, required to weatherproof the building(s), and including interior sealant work. This section contains requirements pertaining to all weather and interior sealant work throughout the project and becomes a part of each and every section calling for sealant and caulking, unless otherwise specified, as though written in full in each section.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.1.3 Related Work:

- .1 Sealants for firestopping systems are specified in Section 07 8400.
- .2 Sealants for glazing work are specified in Section 08 8000.

1.2 REFERENCES:

The editions of American Society for Testing and Materials (ASTM) Standards referenced herein apply to the work only to the extent specified by the reference thereto. Refer to Section 01 4220 for information concerning availability and use of references.

1.3 SUBMITTALS:

1.3.1 Product Data: Submit copies of manufacturer's specifications, recommendations and installation instructions for each type of sealant and related material required.

.1 Include manufacturer's letter of certification, or certified test reports indicating that each material complies with the requirements specified herein and is suitable for the applications indicated. Indicate by transmittal that a copy of each instruction has been forwarded to the installer.

.2 Include manufacturer's letter of certification indicating that sealants, primers and cleaners comply with regulations controlling use of volatile organic compounds.

1.3.2 Samples: Submit samples indicating the color range available for each sealant material intended for installation in locations exposed to view. Materials installed before approval of color will be subject to removal and replacement with approved material.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Manufacturer's Qualifications: Obtain joint sealants from a single manufacturer for each different product required. Obtain elastomeric sealants only from manufacturers who will, if required by the Architect, send a qualified technical representative to the Project site to advise the installer of proper procedures and precautions for the use of these materials.

1.4.2 Installer's Qualifications: Employ a firm having a successful experience in the application of the types of materials required.

1.4.3 Regulatory Requirements. The quantity of volatile organic compounds (VOC) used in sealants, primers and cleaners shall not exceed the limits permitted under the current regulations for architectural coatings of the San Diego County Air Pollution Control District.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Deliver sealants to the Project site in unopened containers, labeled with the manufacturer's name, brand designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

1.5.2 Store sealants in an area where they will not be subject to temperatures above 100 degrees F or below 40 degrees F. Do not store materials that have exceeded the manufacturer's recommended shelf life.

1.6 PROJECT CONDITIONS:

Do not apply sealants when the ambient temperature is above 100 degrees F or below 40 degrees F, when the weather is foggy, or rainy, or when joint substrates are wet.

1.7 WARRANTY:

In addition to the warranty and correction of work requirements of the General Conditions, warrant work under this section against moisture penetration for a period of 5 years from the date of "Notice of Completion". The written warranty shall include materials and labor required to repair leaks that develop. The warranty shall be signed by the sealant manufacturer, the sealant installer and the Contractor and shall be submitted in accordance with Division 1.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS:

2.1.1 Type A Sealant: Multiple component, self-leveling polyurethane based sealant meeting the requirements of ASTM C 920, Type M, Grade P, Class 25. Acceptable products or equal:

Mameco International; Vulkem 245
Pecora Corp.; Urexpan NR-200
L.M. Scofield Co.; Lithoseal Buildingcalk-3S
Sika Corp.; Sikaflex-2c-SL
Sonneborn Building Products; Sonolastic SL 2

2.1.2 Type B Sealant: Single or multiple component, nonsag polyurethane based sealant meeting the requirements of ASTM C 920, Type S or M, Grade NS, Class 25. Do not use single component sealants when excessive movement is expected within the curing time of the sealant. Acceptable products or equal:

Mameco International; Vulkem 116 or 227
Pecora Corp.; Dynatrol I or II
Sika Corp; Sikaflex 1a or 2c-NS
Sonneborn Building Products; Sonolastic NP 1 or NP 2

Tremco; Dymonic or Dymeric

2.1.3 Type C Sealant: Butyl rubber based sealant meeting the requirements of ASTM C 920, Type S, Grade NS, Class 7.5. Acceptable products or equal:

Adco Seal; No. B-100
Pecora Corp.; BC-158
PTI Sealants; PTI 757
Tremco; Butyl Sealant

2.1.4 Type D Sealant: Latex acrylic based sealant meeting the requirements of ASTM C 834. Acceptable products or equal:

Pecora Corp.; AC-20
Sonneborn Building Products; Sonolac
Tremco; Acrylic Latex 834

2.1.5 Type E Sealant: Low modulus silicone sealant meeting the requirements of ASTM C 920, Type S, Grade NS, Class 50. Acceptable products or equal:

Dow Corning Corp.; No. 795
General Electric Co.; Silpruf
Pecora; Corp.; 864 Silicone
Sonneborn Building Products; Sonolastic Omniseal
Tremco; Spectrem 2

2.1.6 Type F Sealant: Narrow joint seam sealant meeting the requirements of AAMA 803.3 and formulated for sealing joints 3/16 inch or smaller in width. Type F Sealant is USDA Approved. Acceptable product or equal:

PTI Sealants; PTI 200

2.1.7 Type G Sealant: Not Used.

2.1.8 Acoustical Sealant: Sealant shall be one of the following types at the Contractor's option:

.1 Polyvinyl chloride foam tape with pressure sensitive tape on one side 3/4 inch wide by the thickness required to accommodate unevenness of substrates and completely fill openings between partition framing and building floors and concrete or masonry wall. Acceptable products or equal:

Norton Co.; Norseal V730 Series
Arlon; Series 6A

.2 Permanently resilient compound manufactured specifically for acoustical applications. Acceptable products or equal:

Ohio Sealants; Sound Calk (solvent type)
Pecora Corp.; BA-98
Tremco; Acoustical Sealant

2.1.9 Colors: Provide sealant colors as follows:

Concrete flatwork - to match concrete.

Concrete walls - to match concrete.
Masonry Walls - to match mortar color.
Aluminum to concrete - to match concrete.
Aluminum to aluminum - aluminum color.
Ceramic tile - to match grout.
Other locations - to match color of adjacent surface.

2.2 MISCELLANEOUS MATERIALS:

2.2.1 Joint Filler: Preformed, compressible, resilient, non-staining, polyurethane, open or closed cell non-outgassing foam, round in shape, with diameter never less than 30 percent greater than width of joint. Sealant manufacturer shall guarantee filler as being suitable for its intended use and entirely compatible with the sealant.

2.2.2 Primer: Product of manufacturer of sealant used.

2.2.3 Lacquer Sealer: Clear, as recommended by sealant manufacturer.

2.2.4 Bond Breaker Tape: Polyethylene tape or other tape as recommended by the sealant manufacturer. Provide self-adhesive tape wherever applicable.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine the joint surfaces, backing, and anchorages of units forming sealant rabbet, and the conditions under which the sealant work is to be performed for conditions that would adversely affect the performance of the sealant. Do not proceed with the sealant work until unsatisfactory conditions have been corrected. Start of sealant work constitutes acceptance of conditions.

3.2 PREPARATION:

3.2.1 Surface Cleaning of Joints: Completely clean joints and spaces to be sealed of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect the joint sealing work. Where necessary, degrease with an approved solvent or commercial degreasing agent. Dry surfaces thoroughly before application of sealants.

.1 If recommended by manufacturer, remove paint and other protective coatings from surfaces to be sealed before priming and sealant application.

.2 Prepare surfaces to receive sealant to conform to the sealant manufacturer's specifications. Use air pressure or other approved methods to achieve required results. Use masking tape to keep sealants off surfaces that will be exposed in the finished work.

3.2.2 Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 JOINT DIMENSIONS:

3.3.1 Butyl Base Type Sealant: Minimum joint width of 1/4 inch, and the depth of 3 times the width of the joint, with the maximum depth 3/4 inch.

3.3.2 Silicone Rubber Sealant: Minimum joint width of 1/4 inch, and depth of approximately one-half the width, but in no case less than 1/4 inch. Other width-to-depth ratios as follows:

JOINT WIDTH:		JOINT DEPTH:	
<u>For Nonporous Surfaces:</u>		<u>Minimum</u>	<u>Maximum</u>
1/4" (minimum)	1/2 of width	1/4"	1/4"
1/4" to 1/2"		Equal to width	
Over 1/2"		Not Permitted	
<u>For Porous Surfaces</u>			
1/4" (minimum)	1/4"	1/4"	1/4"
1/4" to 1/2"		Equal to width	
1/2" to 1"		1/2"	Equal to width
Over 1"		Not Permitted	

3.3.3 Acrylic and Polyurethane: Minimum joint width of 1/4 inch, and depth equal to width, but in no case deeper than 1/2 inch. Other width-to-depth ratios as follows:

JOINT WIDTH:		JOINT DEPTH:	
<u>For Nonporous Surfaces:</u>		<u>Minimum</u>	<u>Maximum</u>
1/4" (minimum)		1/4"	1/4"
1/4" to 1/2"		Equal to width	Equal to width
Over 1/2" to 1" maximum		1/2"	1/2"
<u>For Porous Surfaces</u>			
1/4" (minimum)	1/4"	1/4"	1/4"
1/4" to 1/2"		Equal to width	
1/2" to 1"		1/2"	Equal to width
Over 1"		Not Permitted	

3.4 SEALANT APPLICATION SCHEDULE:

3.4.1 Type A Sealant: Use for all joints in exterior and interior concrete, and ceramic tile floors and paved surfaces subject to foot traffic.

3.4.2 Type B Sealant: Use for all vertical joints in masonry, plaster, and concrete, exposed on the exterior of the building and for sealing around metal door, window and louver frames penetrating these surfaces.

3.4.3 Type C Sealant: Use for interior wall penetrations for pipe or conduit that will be concealed by escutcheons or other trim or plates and for lap joints in sheet metal work.

3.4.4 Type D Sealant: Use for joints, voids, and penetrations in interior surfaces exposed to view and requiring painting.

3.4.5 Type E Sealant: Use for all joints in contact with organically coated aluminum and for joints between precast and tilt-up concrete panels.

3.4.6 Type F Sealant: Use for all narrow joints in aluminum storefront and curtain wall framing where joints are mechanically restricted from movement. Type F Sealant is USDA Approved.

3.4.7 Type G Sealant: Not Used.

3.4.8 Acoustical Sealant: Use to seal all perimeter joints around sound retardant partitions and around electrical boxes and other penetrations in these partitions.

3.5 APPLICATION:

3.5.1 Installation of Sealant Filler: Install sealant fillers to provide support for sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths as specified herein and to allow optimum sealant movement capability.

- .1 Do not leave gaps between ends of joint filler.
- .2 Do not stretch, twist, puncture, or tear joint fillers.
- .3 Remove absorbent joint fillers that have become wet before sealant application and replace with dry material.
- .4 Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.

3.5.2 Install sealants in compliance with the details, square and perpendicular to the adjoining surfaces. Rounded off finishing will not be allowed.

3.5.3 Seal around all openings in exterior walls, and other locations indicated or required for waterproofing the building(s). Seal all other joints as herein specified, indicated, and required to properly complete the building(s).

3.5.4 Apply sealants using specified materials and proper tools. Prepare surfaces (cleaning, etc.) and apply sealant as specified herein and in accordance with the manufacturer's printed instruction and recommendations.

3.5.5 Do not use sealants when they become too gelled to be discharged in a continuous flow from the gun. Modification of sealants by addition of liquids, solvents, or powders will not be permitted.

3.5.6 Apply sealants with guns having proper size nozzles. Use sufficient pressure to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where the use of the gun is impracticable, use suitable hand tools.

3.5.7 Neatly point sealed joints on flush surfaces with beading tool, and internal corners with eaving tool. Remove excess material. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Complete sealing before final coats of paint are applied.

3.6 MISCELLANEOUS JOINT SEALING WORK:

The entire extent of sealing work is not necessarily fully or individually described herein. Provide sealing wherever required to prevent light leakage as well as moisture leakage. Refer to drawings for conditions and related parts of the work.

3.7 CLEANING:

Clean all types of surfaces materials adjoining sealed joints of smears of sealant or other soiling due to sealant application.

END OF SECTION

STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Steel doors and pressed steel frames for steel doors, wood doors, exterior windows, and cased openings.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCE STANDARDS:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the references. Refer to Section 01 4220 for information concerning availability and use of references.

American National Standards Institute (ANSI)
American Society for Testing and Materials (ASTM)
National Fire Protection Association (NFPA)
National Association of Architectural Metal Manufacturers (NAAMM)
Steel Door Institute (SDI)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit shop drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at each wall opening condition, details of construction, location and installation requirements of door and frame hardware and reinforcements, details of joints and connections, coordination of glazing frames and doors. Show anchorage and accessory items.

.1 Provide schedule of doors and frames using same reference numbers for details and openings as those indicated on drawings.

.2 Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.3.2 Product Data: For each type of door and frame indicated, include door designation, type, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

1.3.3 Templates: Secure templates from finish hardware supplier for specified hardware and mounting locations.

1.3.4 Oversize Construction Certificates: Submit for door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

1.3.5 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Provide doors and frames meeting the requirements of either ANSI/SDI-100-91 or NAAMM HMMA 861 for stock sizes and designs; and NAAMM HMMA 861 for nonstock sizes or designs.

1.4.2 Fire-Rated Door Assemblies: Meet the requirements of the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 7 - Fire-Resistant Materials and Construction for the fire resistive ratings indicated, and which are labeled by Underwriters' Laboratories, Factory Mutual, or other testing agency acceptable to the State Fire Marshal.

.1 Temperature Rise Rating: At exit stairwell enclosures, exit passageways, and horizontal exits, provide doors which are labeled for a maximum transmitted temperature end point not to exceed 450 degrees above ambient at the end of 30 minutes of fire exposure.

.2 Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to the State Fire Marshal that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

.3 Where fire resistive doors are indicated to be equipped with louvers, provide fusible link type louvers acceptable to the testing agency labeling the fire door and frame assembly.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Delivery: Provide packaging such as cardboard or other containers to protect surfaces of hollow metal doors. Strap welded frames together in pairs with head of one unit inverted or provide temporary spreaders fastened to the bottom of each frame.

.1 Provide additional protection to prevent damage to finish of factory-finished doors and frames.

1.5.2 Storage: Store doors and frames on platforms under cover. Store doors and frames in dry storage spaces, with adequate ventilation, free from dust, and which permits easy access for inspection and handling. Avoid using nonvented plastic or canvas shelters that create a humidity chamber. If the wrapper on the door becomes wet, remove the wrapper immediately.

To promote air circulation, provide a 1/4 inch space between doors. Mark or tag each door and frame with the appropriate opening identification symbol.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

2.1.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

Ceco Corp.
Door Components, Inc.
Steelcraft Manufacturing Co.

2.1.3 Lead-Lined Steel Doors and Frames:

American Steel Products Corp.
Pioneer Industries.
Precision Metals, Inc.
Security Metal Products, Inc.

2.2 MATERIALS:

2.2.1 Cold Rolled Steel Sheets: ASTM A 366, stretcher leveled.

2.2.2 Hot Rolled Steel Sheets: ASTM A 569, pickled and oiled.

2.2.3 Hot-dip Galvanized Steel Sheets: ASTM A 653, coating designation A60 or G60, mill phosphatized. Thicknesses specified include galvanizing.

2.2.4 Mineral Fiberboard Core Material: SDI-100-91, para. 2.2.3.2.

2.3 FLUSH DOOR CONSTRUCTION:

2.3.1 General: Fabricate doors of stock sizes and designs in accordance with either SDI-100-91 or NAAMM HMMA 861. Fabricate doors of nonstock sizes or designs in accordance with NAAMM HMMA 861.

2.3.2 Door Faces:

.1 Fabricate exterior doors with 0.064 inch (16 gage) A60 galvanized steel faces, seamless design with no seams in faces and all edge seams continuously welded, filled and ground smooth.

.2 Fabricate interior doors with 0.0478 inch (18 gage) A60 Galvanized steel faces, seamless design with no seams in faces and all edge seams continuously welded, filled and ground smooth.

2.3.3 Internal Construction: Fabricate doors with any of the internal construction methods specified herein and in accordance with SDI-100-91 or NAAMM HMMA 861 except as specified below:

.1 Fire Rated Doors: Fabricate to the requirements of NFPA 252-95 for the hourly rates indicated. Fabricate labeled fire resistive doors at stairwells, exit passageways, and horizontal exits with mineral fiberboard composite core that will provide the specified maximum transmitted temperature end point.

.2 Acoustical Doors: Fabricate with core material selected by the manufacturer to obtain a STC rating of not less than 42 when provided with sound seals and drop bottom specified in Section 08710 and tested in accordance with ASTM E 90 and E 413.

2.3.4 Hollow Metal Panels: Provide hollow metal panels of same materials, construction, and finish as specified for doors.

2.4 FRAME FABRICATION:

2.4.1 Fabricate frames in accordance with SDI-100-91 or NAAMM HMMA 861 except as modified herein. Provide metal frames for doors, transoms, sidelights, borrowed lights and other openings, of types and styles indicated and scheduled. Conceal fastenings, unless otherwise indicated.

.1 Fabricate frames for exterior doors of 0.079 inch (14 gage) hot-dip galvanized sheet steel. Face weld corners and grind welds smooth. Provide stops a minimum of 5/8 inch deep.

.2 Fabricate frames for exterior doors of 0.0747 inch (14 gage) hot-rolled or cold-rolled sheet steel. Face weld corners and grind welds smooth. Provide stops a minimum of 5/8 inch deep.

.3 Fabricate frames for all other doors of 0.0598 inch (16 gage) hot-rolled or cold-rolled steel sheet. Provide with corners of face welded type.

2.4.2 Anchors: Provide one floor anchor and the number of wall anchors listed below, welded into each jamb member. Provide wall anchors of the type recommended by the manufacturer for the specific wall condition and of same material specified for frames. Provide head anchors welded into head member as recommended by the frame manufacturer. All anchors shall be 0.052 inch (18 gage) minimum for galvanized frames and 0.0478 (18 gage) minimum for cold or hot rolled steel frames.

2.4.3 Anchors: Provide one floor anchor and the number of wall anchors listed below, welded into each jamb member. Wall anchors shall comply with SDI 111, of type indicated for the specific wall condition and of same material specified for frames. Provide head anchors welded into head member as recommended by the frame manufacturer. All anchors shall be 0.064 inch

(16 gage) minimum for galvanized frames and 0.0589 (16 gage) minimum for cold or hot rolled steel frames. Provide "Z" spacer type anchors for all wood studs.

<u>Wall Material</u>	<u>Door Height</u>	<u>No. of Anchors</u>
Concrete, Masonry and wood studs	Up to 7'-0"	3
	7'-2" to 9'-6"	4
Steel Studs	Up to 7'-0"	4
	7'-2" to 9'-6"	5

2.4.4 Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.

2.5 HARDWARE PREPARATION:

Reinforce doors and frames for hardware in accordance with SDI-100-91 or NAAMM HMMA 861 as applicable, except provide 8 gage minimum hinge reinforcement for exterior doors.

2.6 GLAZING:

Provide glazed openings with not lighter than 0.040 inch (20 gage) galvanized steel glazing stops at galvanized doors and frames; and 0.0359 inch (20 gage) hot or cold rolled steel glazing stops at hot or cold rolled steel doors and frames. Stops shall be nonremovable on exterior or corridor side of door. Glass and glazing materials and methods are specified in Section 08 80 00.

2.7 CLEARANCES:

Provide doors and frames with clearances in accordance with SDI-100-91 or NAAMM HMMA 861.

2.8 FINISH:

2.8.1 Factory Primer: After fabrication, clean, phosphate treat, and dip or spray coat all exposed surfaces of doors and frames with a rust-inhibitive primer complying with ANSI A 224.1-1987.

2.8.2 Field Finish: Field finish painting is specified in Section 09 90 00.

2.8.3 Factory Finish: After priming, finish doors with a baked-on, rust-inhibiting, semi-gloss enamel capable of passing a 200-hour salt spray test and a 500-hour humidity test in accordance with ASTM B 117 and D 1735.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 Set frames accurately in position and plumb, align, and brace them securely until permanent anchors are set. Anchor the bottom of frames securely to floors with expansion bolts or with powder-driven fasteners. Build in or secure wall anchors to adjoining construction as indicated or required by adjoining construction. Where frames require ceiling struts or other structural overhead bracing, anchor such struts securely to structure above, as required. Fill frames solid with portland cement grout where indicated or required by fire rating of opening.

3.1.2 Hang doors to fit snug against stops, free from hinge bind, and with uniform clearance of 3/32 inch at heads and jambs. After hanging, make all adjustments and then remove lockset hardware for finish painting. Reinstall hardware after finish painting.

3.1.3 Install fire rated doors and frames, including hardware and operational characteristics, in accordance with the requirements of the listing agency.

END OF SECTION

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SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Standard hollow metal doors and frames

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- C. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.
- D. Samples for Verification:
 - 1. Finishes: For each type of exposed finish required
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.
- E. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.3 INFORMATIONAL SUBMITTALS

1.4 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.5 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
 - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Curries Company; ASSA ABLOY.
 - 2. Deansteel Manufacturing Company, Inc.
 - 3. Fleming Door Products Ltd.; Assa Abloy Group Company.
 - 4. Mesker Door Inc.
 - 5. Pioneer Industries.
 - 6. Security Metal Products; a brand of ASSA ABLOY.

2.2 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2; SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.

- b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 or A60 coating.
 - d. Edge Construction: Full Flush
 - e. Core: Manufacturer's standard
2. Frames:
- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 or A60 coating.
 - b. Construction: Full profile welded.
3. Exposed Finish: Factory.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
- 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
- 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- C. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

- D. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.5 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 - 3. Terminated Stops: Terminate stops 6 inches above finish floor with a 90-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with SDI A250.3.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames according to NFPA 80.
 - 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 4. Solidly pack mineral-fiber insulation inside frames.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

3.3 CLEANING AND TOUCHUP

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

- D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 1113

SECTION 08 1416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core flush wood doors medium-density-overlay faces.
2. Fire-rated wood door frames.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door frame construction.
5. Factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Dimensions and locations of blocking for hardware attachment.
3. Dimensions and locations of mortises and holes for hardware.
4. Requirements for veneer matching.
5. Doors to be factory finished and application requirements.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. for each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

1.3 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 FLUSH WOOD DOORS GENERAL

- A. Quality Standard: In addition to requirements specified, comply with "Architectural Woodwork Standards" WDMA I.S. 1A.

2.3 SOLID-CORE FLUSH WOOD DOORS

- A. Interior Doors

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eggers Industries.
 - b. Haley Brothers, Inc.
 - c. Lambton Doors.
 - d. Marshfield DoorSystems, Inc.
 - e. Mohawk Flush Doors, Inc.
 - f. Oshkosh Door Company.
 - g. Poncraft Door Company.
 - h. Vancouver Door Company.
 - i. VT Industries Inc.
2. Performance Grade: WDMA I.S. 1A Heavy Duty
3. Performance Grade:
 - a. WDMA I.S. 1A Heavy Duty unless otherwise indicated on Drawings.
4. Architectural Woodwork Standards WDMA I.S. 1A Grade: Premium
5. Colors, Patterns, and Finishes: As indicated
6. Exposed Vertical and Top Edges: Hardwood edges for staining to match faces
 - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - c. At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

- 1) Screw-Holding Capability: 400 lbf in accordance with WDMA T.M. 10.
7. Core for Non-Fire-Rated Doors: Either glued wood stave or WDMA I.S. 10 structural composite lumber.
8. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

END OF SECTION 08 1416

SECTION 08 2100

WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Wood veneer flush doors.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.1.3 Related Sections: Steel Door Frames are specified in Section 08 1100.

1.2 REFERENCE STANDARDS:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American National Standards Institute (ANSI)
American Society for Testing and Materials (ASTM)
Architectural Woodwork Standards (AWI)
Fir and Hemlock Door Association (FHDA)
National Wood Window and Door Association (NWWDA)
National Fire Protection Association (NFPA)
Woodwork Institute (WI)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit a door schedule keyed to the opening identification symbols indicated, showing sizes, elevations, swing, fire ratings, location and extent of hardware blocking, and size and location of glazed and louvered openings.

1.3.2 Product Data: Submit catalog cuts or other data indicating thickness, details of stile, rail and core construction of doors, type of adhesive, face veneer species and grade, and details of glazed and louvered openings.

1.3.3 Samples: Submit samples of wood veneers indicated or specified to receive a transparent finish, showing color range and grain of veneers. Submit samples of plastic laminate showing pattern, finish and color.

1.3.4 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Certificate of Compliance:

.1 Issue a WI Certified Compliance Certificate before delivery of doors certifying that doors fully meet all requirements of the grade specified.

.2 After completion issue a WI Certified Compliance Certificate for Installation.

1.4.2 Regulatory Requirements:

.1 Labeled fire resistive doors and frames shall conform to the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 7 - Fire-Resistant Materials and Construction for the fire resistive ratings indicated. Fire resistive doors and frames shall bear the label of Underwriters' Laboratories, Factory Mutual, or other testing agency acceptable to the State Fire Marshal.

.2 Fire Rated Doors, Intumescent Seals: UL10C/UBC-7-2 compliant. If intumescent seals are required for the fire labeled assembly, furnish flush with door edge type seals or kerfed in frame type seals. Surface applied adhesive seals will not be accepted. Coordinate frame fabrication to allow use of kerfed in frame type seals options.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Delivery: Seal all four edges of doors before shipment. Deliver doors to the site after plaster, concrete and masonry are dry and the building has reached the average prevailing relative humidity of the locality.

1.5.2 Storage and Handling: Store doors in an area where there will be no great variation in temperature or humidity. Stack doors flat on 2" by 4" lumber laid 12 inches from ends and across the center. To protect surfaces, provide plywood or cardboard under the bottom door and over the top of the stack. Do not drag doors across one another.

1.6 WARRANTY:

In addition to the warranty and correction of work provisions of the General Conditions, furnish to the Owner a written warranty against defects in workmanship and materials including delamination in any degree, warp or twist of 1/4 inch or more in any 3'-6" by 7'-0" section of a door, telegraphing of any part of core assembly through face veneer to cause surface variation of 1/100 inch or more in a 3 inch span, defects which impair and affect performance of the door. Replacement under this warranty shall include hanging, installation of hardware and finishing. The warranty shall be signed by the door manufacturer and the Contractor and shall be submitted in accordance with Division 1. Warranty periods:

Interior solid core and mineral core: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

2.1.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

Algoma Hardwoods, Inc.
Eggers Industries
Marshfield DoorSystems, Inc.
Oshkosh Architectural Door Company

2.2 INTERIOR FLUSH DOORS:

2.2.1 Door Thickness: 1-3/4 inches thick unless otherwise indicated.

2.2.2 Door Construction for Solid Core Non-rated and 20 Minute Fire Rated Doors: Comply with NWWDA I.S. 1-A, Premium Grade, for 5ply hot press particleboard core construction and the following additional requirements: (5ply cold press construction will not be accepted).

.1 Top and Bottom Rails: Minimum width of 1-1/8 inches except provide 5 inch wide top and bottom rails for doors scheduled to receive exit devices and 5 inch top rails on doors scheduled to receive surface mounted closers. Bond rails securely to the core.

.2 Stiles: Minimum width of 1-3/8 inches. Provide minimum 5" by 12" blocking in particleboard core doors adjacent to both stiles of doors scheduled to receive exit device. Bond stiles securely to the core.

2.2.3 Door Construction for 45, 60, and 90 Minute Fire Rated Doors: Comply with NWWDA I.S. 1-A, Premium Grade, for 5ply hot press mineral core construction and the following additional requirements: (5ply cold press construction will not be accepted).

.1 Testing: Provide doors of same construction which has been previously tested in accordance with NFPA 252-95 for the hourly ratings indicated. Provide doors bearing the label of Underwriters' Laboratories, Factory Mutual or of another testing agency acceptable to the State Fire Marshal.

.2 Top and Bottom Rails: Maximum width permitted by label requirements. Provide 7 inch wide top rails and 5 inch wide bottom rails for doors scheduled to receive exit devices and 7 inch top rails on doors scheduled to receive surface mounted closers. Bond rails securely to the core.

.3 Stiles: Maximum width permitted by label requirements. Provide minimum 5 inch by 10 inch blocking adjacent to lock stile of doors scheduled to receive exit devices. Bond stiles securely to the core.

.4 Stile Performance Criteria: Meet the requirement of the labeling agency requirements. In addition, comply with the following:

- a. Split Resistance: Average of 10 test samples shall be not less than 900 load pounds when tested in accordance with "Test Method to Determine Split Resistance of Hinge Edges of Composite Type Fire Doors."
- b. Direct Screw Withdrawal: Average of 10 test samples shall be not less than 650 load pounds when tested for direct screw withdrawal in accordance with ASTM D 1037-96a, using a No. 12 by 1-1/4" steel threaded-to-the-head wood screw cadmium plated or rust resistant type.
- c. Cycle/Slam: 200,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of ANSI A151.1-1988, Section 2.5.

2.2.4 Door Faces and Edges for Opaque Finished Doors: NWWDA I.S. 1-A-87 and the following additional requirements:

- .1 Door Faces: Sound grade natural birch or ash face veneers.
- .2 Adhesives: Type I or II.
- .3 Stile Edges: As required by NWWDA I.S. 1-A for construction grade specified.

PART 3 - EXECUTION

2.3 INSTALLATION:

2.3.1 Hang doors to fit snug against all stops, to hang free from hinge bind, and with uniform clearance of 1/16 inch to 1/8 inch at heads and jambs and 3/8 inch to 7/16 inch at bottom

except undercut doors for thresholds and carpets and for ventilating purposes where indicated. Bevel the lock edges 1/8 inch in 2 inches. Immediately after cutting, seal cuts with spar varnish or other water resistant sealer. Replace or rehang doors which are hinge bound or do not swing freely.

2.3.2 Installation of labeled fire resistive doors, including hardware and operational characteristics, shall be in accordance with the labeling or listing agency requirements. Fire resistive doors shall not be undercut.

END OF SECTION

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SECTION 08 3113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acudor Products, Inc.
 - b. Babcock-Davis.
 - c. Cendrex Inc.
 - d. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - e. Larsens Manufacturing Company.
 - f. Nystrom, Inc.
 - 2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
 - 3. Locations: Wall and ceiling
 - 4. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage factory finished.
 - 5. Frame Material: Same material and thickness as door
 - 6. Latch and Lock: Cam latch, screwdriver operated

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Frame Anchors: Same material as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.
 - 1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.
- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
 - 2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.
 - a. Color: As selected by Architect from full range of industry colors
- E. Stainless Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3. Bright, Cold-Rolled, Unpolished Finish: ASTM A480/A480M No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

3.4 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 08 3113

ACCESS PANELS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Wall and ceiling access panels.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 SUBMITTALS:

1.2.1 Shop Drawings: Submit shop drawings showing location of all access panels.

1.2.2 Product Data: Submit catalog cuts or other data indicating details of construction of panels, gages of metal, hardware, label compliance, and specifications for shop priming.

1.2.3 Submittal procedures and quantities are specified in Division 1.

1.3 REGULATORY REQUIREMENTS:

1.3.1 Labeled fire resistive access panels shall conform to the California Code of Regulations (CCR) Title 24 Part 2, California Building Code, Chapter 7, Fire-Resistant Materials and Construction, for the fire resistive ratings indicated. Fire resistive access panels shall bear the label of Underwriters' Laboratories, Warnock Hersey, or other testing agency acceptable to the State Fire Marshal.

1.4 DELIVERY, STORAGE, AND HANDLING:

Provide packaging such as cardboard or other containers to protect access panels during delivery and storage. Store access panels elevated off the floor in a dry weather tight enclosure. Provide adequate ventilation to avoid condensation. If the container becomes wet remove the panel from the container immediately.

PART 2 - PRODUCTS

2.1 FIRE RESISTANT WALL AND CEILING ACCESS PANELS:

2.1.1 Fire Rated Wall and Ceiling Access Panels: Acceptable products or equal:

Cesco Products; Style FB
Larsen's Manufacturing Company; L-FRAP
Milcor, Inc.; 3208 Series
Nystrom, Inc.; FR Series

.1 Frame and Panel Assembly: Bear the Underwriters' Laboratories, Inc. label for 1-1/2 hour B label, 250 degrees maximum 30 minute temperature rise.

.2 Frames: 16 gage steel.

- .3 Panels: 20 gage steel sandwich type equipped with an automatic closing mechanism.
- .4 Lock Assembly: Self-latching type with key operated cylinder lock and a mechanism to release the latch bolt from the inside. Furnish 2 keys per lock and key all locks alike.
- .5 Hinges: Continuous type, steel with stainless steel pins.
- .6 Finish: Factory applied baked enamel over a protective phosphate coating.

2.1.2 Fire Resistant Ceiling Access Panels: Acceptable products or equal:

Cesco Products; Style CTR-II
 Larsen's Manufacturing Company; L-CPB
 Milcor, Inc.; Style ATR 3204 Series
 Nystrom, Inc.; AW Series

- .1 Frames: 16 gage steel.
- .2 Panels: 18 gage steel pan type with 1-1/2 inch deep recess to receive fire-resistant acoustical tile or gypsum board.
- .3 Lock Assembly: Screwdriver operated with metal cams with a grommet to finish to allow access hole through the finish materials to latch.
- .4 Hinges: Continuous type, steel with stainless steel pins.
- .5 Finish: Factory applied baked enamel prime coat over a protective phosphate coating on steel.

2.2 NON-RATED WALL AND CEILING ACCESS PANELS:

2.2.1 Panels Mounted in Gypsum Board: Acceptable products or equal:

Cesco Products; Style SR-III
 Larsen's Manufacturing Company; L-DWC
 Milcor, Inc.; Style DW
 Nystrom, Inc.; WB Series

- .1 Frames: 16 gage steel with 26 gage galvanized steel casing bead surrounding the frame or 0.060 inch extruded aluminum.
- .2 Panel: 14 gage steel.
- .3 Hinges: Concealed spring hinges or concealed piano hinges, opening to 175 degrees.
- .4 Locks: Flush, screwdriver operated with metal cams.
- .5 Finish: Factory applied baked enamel prime coat over a protective phosphate coating on steel.

2.2.2 Panels Mounted in Plaster: Acceptable products or equal:

Cesco Products; Style PX

Larsen's Manufacturing Company; L-PSW
Milcor, Inc.; Style K
Nystrom, Inc.; PW Series

- .1 Frames: 16 gage steel with 22 gage galvanized steel casing bead or 0.060 inch extruded aluminum with expanded metal flange surrounding the frame.
- .2 Panel: 14 gage steel.
- .3 Hinges: Concealed spring hinges or concealed piano hinges, opening to 175 degrees.
- .4 Locks: Flush, screwdriver operated with metal cams.
- .5 Finish: Factory applied baked enamel prime coat over a protective phosphate coating on steel.

PART 3 - EXECUTION

3.1 INSTALLATION:

- 3.1.1 Provide access panels where indicated or where required to provide access to valves, flow indicators, dampers and air splitters concealed with walls or chases or above ceilings.
- 3.1.2 Install access panels in accordance with the drawings and the manufacturer's directions.
- 3.1.3 Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces.
- 3.1.4 Install concealed-frame access panels flush with adjacent finish surfaces.

END OF SECTION

Section 08 5113
Aluminum Windows

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash and operating sash.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

1.2 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Rough opening framing.
- B. Section 07 2500 - Weather Barriers: Sealing frame to weather barrier installed on adjacent construction.
- C. Section 07411 - Preformed Metal Wall Panels
- D. Section 07620 - Sheet Metal Flashing and Trim
- E. Section 07650 - Flexible Flashing
- F. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.
- G. Section 08 4313 - Aluminum-Framed Storefronts: Operable sash within framing system.
- H. Section 08 8000 - Glazing.
- I. Section 08 8000 - Glazing.

1.3 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- E. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

1.4 PERFORMANCE REQUIREMENTS

- A. Design and size windows to withstand the following load requirements, when tested in accordance with ASTM E 330 using test loads equal to 1.5 times the design wind loads with 10 second duration of maximum load:
 - 1. Design Wind Loads: Comply with requirements of CBC code.
 - 2. Positive Design Wind Load: 70 lbf/sq ft.
 - 3. Negative Design Wind Load: 70 lbf/sq ft.
 - 4. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
- B. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- C. Thermal Resistance: Not more than .59 BTU/hr/sf/deg F when tested in accordance with AAMA 1503.1
- D. Air Infiltration: Limit air infiltration through assembly to 0.1 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.
- E. Condensation Resistance Factor: CRF of 53 when measured in accordance with AAMA 1503.1.
- F. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 12 lbf/sq ft.
- G. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system.

1.5 SUBMITTALS

- A. See Section 01 3300 - Submittals, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Performance Validation: Provide specified performance validation before submitting shop drawings or starting fabrication.
- D. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.
- E. Samples: Submit two samples, 12 by 12 inch in size illustrating typical corner construction, accessories, and finishes.
- F. Submit two samples of operating hardware.
- G. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- H. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. The architectural aluminum supplier shall have a quality system registered to one of the ISO 9000 series of standards. The quality system shall be certified by a Registrar approved by the Accreditation Board (RAB) or another, international approval authority.
 - 1. The certificate shall be current and in good standing with the Registrar which issued it.
 - 2. The supplier shall furnish, upon request, a copy or copies of the current certificate.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.8 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Kawneer Company; Product 8400 TL Isolock..
- B. Substitutions: See Section 01 2500 - Substitutions

2.2 WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: 3-1/2 inches.
 - 2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 6. Condensation Resistance Factor: 58 minimum.
 - 7. Overall U-value, Including Glazing: .60, maximum.
 - 8. Life Cycle Requirements: No damage to fasteners, hardware parts or other components that would render operable windows in operable and not reduction in air and water infiltration resistance when tested according to AAMA 910.

- B. Performance Requirements: Provide products that comply with the following:
 - 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - a. Performance Class (PC): R.
 - 2. Performance Validation: Windows shall comply with AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements as indicated by having AAMA, WDMA, or CSA certified label, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
- C. Fixed, Non-Operable Type:
 - 1. Construction: Thermally broken.
 - 2. Glazing: Double; clear; low-e.
 - 3. Exterior Finish: Class I color anodized.
 - 4. Interior Finish: Class I natural anodized.
- D. Horizontal Sliding Type:
 - 1. Construction: Thermally broken.
 - 2. Provide screens.
 - 3. Glazing: Double; clear; low-e.
 - 4. Exterior Finish: Class I color anodized.
 - 5. Interior Finish: Class I color anodized.
- E. Single-Hung Type:
 - 1. Construction: Thermally broken.
 - 2. Provide screens.
 - 3. Glazing: Single; clear; transparent.
 - 4. Exterior Finish: Class I color anodized.
 - 5. Interior Finish: Class I color anodized.

23 COMPONENTS

- A. Frames: 4" inch wide, of 0.090 inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Glazing: As specified in Section 08 8000.
- C. Thermal Barrier. The thermal barrier shall be a minimum 3.8" (9.5) separation consisting of a two-part, chemically curing high density polyurethane which is mechanically and adhesively bonded to the aluminum.
- D. Sills: Provide a Kawneer "Full Depth Sill" at all sills
- E. Sill Extension: Provide a Kawneer "Sub Sill" as shown on drawings. Size per drawings.
- F. Insect Screens: 14/18 mesh, steel strands.
- G. Operable Sash Weatherstripping: Nylon pile; permanently resilient, profiled to achieve effective weather seal.
- H. Glazing Materials: As specified in Section 08 8000.
- I. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

24 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

25 HARDWARE

- A. Single Hung Windows
 - 1. Aluminum Auto Lock

- 2. Standard Sweep Lock
- 3. Heavy Duty Balances
- B. Horizontal Slider Windows
 - 1. Steel Roller Assembly
 - 2. Standard Sweep Lock
 - 3. Aluminum Auto Lock

26 FABRICATION

- A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide internal drainage of glazing spaces to exterior through weep holes.

27 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.
- B. Finish Color: As selected by Architect from manufacturer's standard range.
- C. Apply 1 coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.2 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- E. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
- F. Install operating hardware not pre-installed by manufacturer.
- G. Install glass and infill panels in accordance with requirements specified in Section 08 8000.
- H. Dissimilar Materials: Provide separation of aluminum materials and other corrodible surfaces from sources of corrosion or electrolytic action contact points by complying with AAMA 101, Appendix, titled "Dissimilar Materials."

3.3 **TOLERANCES**

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.4 **ADJUSTING**

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.5 **CLEANING**

- A. Adjust hardware for smooth operation and secure weathertight closure.
- B. Remove protective material from factory finished aluminum surfaces.
- C. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- D. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

End of Section

TUBULAR SKYLIGHT

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Tubular skylights.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCE STANDARDS:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the references. Refer to Section 01 4220 for information concerning availability and use of references.

American National Standards Institute (ANSI)
American Society for Testing and Materials (ASTM)
Architectural Aluminum Manufacturers Association (AAMA)

1.3 SUBMITTALS:

1.3.1 Product Data: Submit manufacturer's standard technical product data, rough-in diagrams, details, installation instructions and general product information. Data shall show thickness, type, grade, and class of materials; dimensions; details of construction and installation details.

1.3.2 Test Reports: Submit copies of the skylight manufacturer's current International Code Council's Evaluation Service Report (ICC ESR's).

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Regulatory Requirements: Plastic skylights shall comply with the California Code of Regulations (CCR) Title 24 Part 2, 2603.7. Acrylic plastic for domes shall be classified CC1 in accordance with UBC Standard No. 26-7. Furnish and install skylights in accordance with the skylight manufacturer's current ICC ESR's.

1.5 DELIVERY, STORAGE AND HANDLING:

1.5.1 Delivery: Assemblies shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness and wet storage stains upon delivery to the project site.

1.5.2 Storage and Handling: Do not uncrate assemblies until they are ready for use. Store materials in dry, watertight, ventilated areas until immediately before installation.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Acrylic Plastic Glazing: ASTM D 702-81, Type II, grade 3. Acrylic plastic shall be classified CC1.

2.1.2 Aluminum Extrusions: ASTM B 221-96, alloy 6063-T5.

2.2 SOLAR TUBES:

2.3.1 Provide 14" diameter model Solar Tube as manufactured by the following or equal in accordance with Section 01630:

.1 Solatube International, Inc.; Brighten Up Series

2.3.2 Curb Mount: Bristolite or approved equal.

2.3.3 Ceiling Diffuser: Injection molded, acrylic plastic classified as CC2 Plexiglas. Thickness shall be not less than 0.087". Provide special prismatic design to maximize light output.

2.3.5 Roof Flashing: All Solatube flashings are fabricated from a single piece resulting in a seamless finished product. Select flashing from manufacturer's standard options to suit job conditions.

.1 6" high spun aluminum, .060 inch thick A93003 for Flat Roof – between flat and 1:12 & problem drainage area.

2.3.6 Main Tube and Reflector:

.1 Fabricate from aluminum sheet meeting the requirements of ASTM B 209, alloy and temper as required by the manufacturer to suit forming operations and finish requirements, .020 inch thick.

.2 Finish: Provide exposed aluminum surface with high polished specular finish meeting AAMA designation M21C31A31. Reflective surface to be Spectralight 2000 or equal. Specular reflectance to be 92 percent and total reflectance to be 95 percent.

2.3.7 Accessories:

.1 Dress Ring to be 30 percent talc filled polypropylene or high impact ABS.

.2 Sealant – Polyurethane or copolymer – based elastomeric sealant – use type provided or recommended by the manufacturer.

.3 Seals:

a. Weather Seal: Medium density pile weatherstripping and light density polyvinyl chloride foam tape or UV resistant EPDM rubber.

b. Ceiling Diffuser Seal: Closed cell polyethylene foam, 3 pounds per cubic foot, and white polyvinyl chloride seal butt joint welded or EPDM rubber.

.4 Fasteners shall be same as metals being fastened or non-magnetic stainless steel or other non-corrosive metal as recommended by the manufacturer.

2.4 FABRICATION:

2.4.1 Finish, fabricate and shop prepare all assemblies under responsibility of one manufacturer.

2.4.2 Fabricate to allow for thermal movement of materials when subject to a temperature differential from –30 degrees F to +180 degrees F.

2.4.3 Provision shall be made to ensure that water will not accumulate and remain in contact within system components.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine roof openings to assure that they are sized correctly and properly supported with structural angles. Do not start work until deficiencies have been corrected. Start of work of this section constitutes acceptance of openings.

3.2 INSTALLATION:

3.2.1 General: Comply with manufacturer's instructions and recommendations.

.1 Tubular Skylights: Installer to be factory trained and/or certified by the manufacturer prior to commencement of installation. After installation of first unit – conduct field check to determine compliance with specified requirements. Water test in presence of City's Representative or Architect and Contractor Representative. Correct any deficiencies prior to commencing with subsequent units.

3.2.2 Isolation: Where metal surfaces of units are to be installed in contact with noncompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces.

3.3 CLEANING AND PROTECTION:

Clean and polish plastic skylight units, inside and out, using cleaning materials and methods that will not scratch or discolor the plastic surfaces, as recommended by the skylight manufacturer.

END OF SECTION

SECTION 08 7100 - DOOR HARDWARE

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. Mechanical door hardware for the following:
 - a. Swinging doors.
 - 2. Cylinders for door hardware specified in other Sections.
- B. Related Requirements:

1.3 ALLOWANCES

1.4 COORDINATION

- A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.
 - 1. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For electrified door hardware.
 - 1. Include diagrams for power, signal, and control wiring.
 - 2. Include details of interface of electrified door hardware and building safety and security systems.
- C. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 - 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - e. Fastenings and other installation information.
 - f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - g. Mounting locations for door hardware.
 - h. List of related door devices specified in other Sections for each door and frame.
- D. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of electrified door hardware.
 - 1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

- B. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

1.8 MAINTENANCE MATERIAL SUBMITTALS

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC)

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
- a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: 10years from date of Substantial Completion.
 - c. Concealed Floor Closers: 10years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with CBC Sections 11B-404.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 - 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.

5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.

1. Door hardware is scheduled on Drawings

2.4 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:

- a. McKinney Products Company; an ASSA ABLOY Group company.

2.5 SELF-CLOSING HINGES AND PIVOTS

2.6 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch-thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:

- a. Pemko Manufacturing Co.

2.7 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 1. Bored Locks: Minimum 1/2-inch latch bolt throw.
 2. Mortise Locks: Minimum 3/4-inch latch bolt throw.
 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Lock Trim:

1. Description: As scheduled
 2. Levers: Cast.
 3. Escutcheons (Roses): Cast.
 4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latch bolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- F. Mortise Locks: BHMA A156.13; Operational Grade 1 Security Grade 2; stamped steel case with steel or brass parts; Series 1000.
1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. Best Access Systems; Stanley Security Solutions, Inc.

2.8 EXIT LOCKS AND EXIT ALARMS

- A. Exit Locks and Alarms: BHMA A156.29, Grade 1.

2.9 SURFACE BOLTS

- A. Surface Bolts: BHMA A156.16.

2.10 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic Flush Bolts: BHMA A156.3, Type 25; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge.

2.11 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.

2.12 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable

2.13 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. System, "Master Key System," "Grand Master Key System," or "Great-Grand Master Key System" Subparagraph below.

1. Master Key System: Change keys and a master key operate cylinders.
 - a. Provide three cylinder change keys and five master keys.
2. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

2.14 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

2.15 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release
- B. Astragals: BHMA A156.22.

2.16 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. LCN.

2.17 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. IVES.
 - b. Trimco.

2.18 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:

- a. Pemko Manufacturing Co.

- B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

2.19 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:

- a. Zero International, Inc.

2.20 FABRICATION

- A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

- B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Fire-Rated Applications:

- a. Wood or Machine Screws: For the following:

- 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
- 2) Strike plates to frames.
- 3) Closers to doors and frames.

- b. Steel Through Bolts: For the following unless door blocking is provided:

- 1) Surface hinges to doors.

- 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.21 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 9200 "Joint Sealants."
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.

- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

Heading 001

1	SGL	Door 100A	EXTERIOR/HALLWAY
1	SGL	Door 100B	EXTERIOR/HALLWAY
1	SGL	Door 100C	EXTERIOR/HALLWAY
1	SGL	Door 100D	EXTERIOR/HALLWAY
1	SGL	Door 135	EXTERIOR/FLIGHT GEAR
1	SGL	Door 119A	EXTERIOR/DECON

3' 0" X 6'-8" X 1 3/4" X HMD X HMF X NONRTD
JAMB AND HEAD SEALS BY THE DOOR/FRAME MANUFACTURER.

Each Assembly to have:

1	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	PANIC HARDWARE	2100 x 4900 Series	626	PRE
1	EA	ENTRY	45H7AB 14H	626	BES
1	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
1	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER
1	EA	GASKETING	188S-CL	S-CL	ZER
1	EA	DOOR BOTTOM	350A6	AL	ZER
1	EA	DOOR SWEEP	8198AA	AL	ZER

Heading 002

1	SGL	Door 106	HALLWAY/ STORAGE
1	SGL	Door 115	HALLWAY/ STORAGE
1	SGL	Door 116	HALLWAY/ STORAGE
1	SGL	Door 117	HALLWAY/ STORAGE
1	SGL	Door 139	HALLWAY/ STORAGE

3' 0" X 6'-8" X 1 3/4" X SC X KD X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	STOREROOM	45H7D 14H	626	BES
1	EA	OH STOP & HOLDER	81H	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
1	EA	GASKETING	188S-CL	S-CL	ZER

1	EA	DOOR BOTTOM	350A6	A	ZER
1	EA	THRESHOLD	544A MSLA-10	AL	ZER
3	EA	SILENCER	SR64	GRY	IVE

Heading 003

1	SGL	Door 105	DORM ROOM/ BATHROOM
1	SGL	Door 108	DORM ROOM/ BATHROOM
1	SGL	Door 110	DORM ROOM/ BATHROOM
1	SGL	Door 112	DORM ROOM/ BATHROOM
1	SGL	Door 114	DORM ROOM/ BATHROOM
1	SGL	Door 124	HALLWAY/ BATHROOM
1	SGL	Door 129	HALLWAY/ BATHROOM
1	SGL	Door 130	HALLWAY/ BATHROOM
3' 0" X 6'-8" X 1 3/4" X SC X KD X NONRTD			

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	PRIVACY	45H F19	626	BES
1	EA	OH STOP	450S	630	GLY
1	EA	SURFACE CLOSER	4041 DEL	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
1	EA	GASKETING	188S-CL	S-CI	ZER

Heading 004

1	SGL	Door 104	HALLWAY/ DORM ROOM
1	SGL	Door 107	HALLWAY/ DORM ROOM
1	SGL	Door 109	HALLWAY/ DORM ROOM
1	SGL	Door 111	HALLWAY/ DORM ROOM
1	SGL	Door 113	HALLWAY/ DORM ROOM
1	SGL	Door 125	HALLWAY/ DORM ROOM
1	SGL	Door 126	HALLWAY/ DORM ROOM
1	SGL	Door 127	HALLWAY/ DORM ROOM
1	SGL	Door 128	HALLWAY/ DORM ROOM
3' 0" X 6'-8" X 1 3/4" X SC X KD X RTD			

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	DORMITORY	45H 7T (F13)	626	BES
1	EA	OH STOP	450S	630	GLY

1	EA	SURFACE CLOSER	4041 DEL	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
1	EA	GASKETING	188S-CL	S-CI	ZER

Heading 005

1	SGL	Door 101	HALLWAY/ LOBBY
1	SGL	Door 101A	HALLWAY/ LOBBY
1	SGL	Door 102	HALLWAY/ DORM ROOM
1	SGL	Door 103	HALLWAY/ DORM ROOM
1	SGL	Door 120	HALLWAY/ DORM ROOM
1	SGL	Door 121	HALLWAY/ DORM ROOM
1	SGL	Door 122	HALLWAY/ DORM ROOM
1	SGL	Door 123	HALLWAY/ DORM ROOM
1	SGL	Door 132	HALLWAY/ DORM ROOM

3' 0" X 6'-8" X 1 3/4" X SC X KD X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	OFFICE	45H 7AB (F20)	626	BES
1	EA	OH STOP	450S	630	GLY
1	EA	SURFACE CLOSER	4041 DEL	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE
1	EA	GASKETING	188S-CL	S-CI	ZER

Heading 006

1	SGL	Door 118	HALLWAY/ TURNOUT
1	SGL	Door 119	TURNOUT/ DECON
1	SGL	Door 131	HALLWAY/ JANITOR
1	SGL	Door 132	HALLWAY/ CONFERENCE
1	SGL	Door 137	HALLWAY/ TRAINING

3' 0" X 6'-8" X 1 3/4" X SC X KD X NONRTD

Each Assembly to have:

3	EA	HINGE	55860 TA 2714 4.5 X 4 NRP	US26D	McK
1	EA	PASSAGE	45H 7T (F13)	626	BES
1	EA	OH STOP	450S	630	GLY
1	EA	SURFACE CLOSER	4041 DEL	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E CS	630	IVE

1	EA	GASKETING	188S-CL	S-CI	ZER
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Heading 007

1	PR	Door 134	EXTERIOR/ DINING		
			2/3' 0" X 6'-8" X 1 3/4" X HMD X HMF X NONRTD		

Each Assembly to have:

2	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	PANIC HARDWARE	2100 x 4900 Series	626	PRE
1	EA	PANIC HARDWARE	2100 x 4900 Series	626	PRE
2	EA	MORTISE CYLINDER	1E64 C181 RP2	626	BES
1	EA	RIM CYLINDER	1E72 S2 RP3	626	BES
2	EA	LONG DOOR PULL	9264 36" 20" STD	630	IVE
2	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
2	EA	PA MOUNTING PLATE	4040-18PA	689	LCN
2	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
2	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	ASTRAGAL	555AA X 55AA	AL	ZER
2	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

Heading 007

1	PR	Door 134	EXTERIOR/ DINING		
			2/3' 0" X 6'-8" X 1 3/4" X HMD X HMF X NONRTD		

Each Assembly to have:

2	EA	CONT. HINGE	High Traffic	628	PEM
1	EA	PASSAGE	45H 7T (F13)	626	BES
1	EA	PASSAGE	45H 7T (F13)	626	BES
2	EA	MORTISE CYLINDER	1E64 C181 RP2	626	BES
2	EA	SURFACE CLOSER	4041 DEL SHCUSH	689	LCN
2	EA	PA MOUNTING PLATE	4040-18PA	689	LCN
2	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
2	EA	BLADE STOP SPACER	4040-61	689	LCN
1	EA	ASTRAGAL	555AA X 55AA	AL	ZER
2	EA	DOOR SWEEP	8198AA	AL	ZER
1	EA	THRESHOLD	546A MSLA-10	AL	ZER

END OF SECTION 08 7100

METAL SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Light gage metal framing and furring systems for interior non-load bearing plaster and gypsum board partitions, and suspension and furring systems for plaster and gypsum board ceilings and soffits.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 RELATED WORK:

1.2.1 Furring systems designed for mechanical attachment of semi-rigid insulation blankets to concrete or masonry walls are specified in Section 07 2100.

1.2.2 Suspension systems for acoustical ceilings are specified in Section 09 5100.

1.3 REFERENCES:

The editions referenced herein of specifications and standards published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

- American Society for Testing and Materials (ASTM)
- American Iron and Steel Institute (AISI)
- Western Lath/Plaster/Drywall Industries Association (WLPDIA)

1.4 SUBMITTALS:

1.4.1 Product Data: Submit framing manufacturer's literature, including a current ICC ESR Evaluation Report, showing tabulation of structural properties, load capacities, dimensions, metal gages and type of coating for all framing and furring members. Submit powder driven fastener manufacturer's current International Code Council Evaluation Service Reports (ICC ESR's).

1.4.2 Submittal procedures and quantities are specified in Division 1.

1.5 REGULATORY REQUIREMENTS:

1.5.1 Support framing for walls and ceilings shall conform to the California Code of Regulations (CCR) Title 24 Part 2, California Building Code, Chapter 25 - Gypsum Board and Plaster. Support framing for fire resistive walls, partitions and ceilings shall also conform to CCR Title 24 Part 2 Chapter 7 - Fire-Resistant Materials and Construction, and which are listed in the current UL "Fire Resistance Directory".

1.5.2 Furnish and install wall framing and powder driven fasteners in accordance with the framing and fastener manufacturer's current ICC ESR's Evaluation Reports.

1.6 DELIVERY, STORAGE, AND HANDLING:

Deliver materials to the project site and store them in adequately ventilated dry locations. If it is necessary to store materials outside, stack them off the ground on a platform and fully protect them from the weather.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

2.1.1 Acceptable manufacturers or equal:

Allied American Studco, Inc.
California Expanded Metal Products Co.
Unimast, Inc.
Western Metal Lath Co.

2.2 MATERIALS:

2.2.1 Hot-dip Zinc Coated Steel: ASTM A 653, designation G60.

2.2.2 Carbon Steel: ASTM A 568. Provide framing components with electro-galvanized finish, conforming to ASTM A 633, Type RS or shop-applied red-oxide, zinc chromate or other similar primer.

2.2.3 Powder Driven Fasteners: Types and sizes indicated on the structural drawings. Acceptable manufacturers or equal:

Hilti Corp.; ICBO #2895
ITW/Ramset/Red Head; ICBO #1372
Kwik Bolt; ICBO #2156

2.2.4 Screws: No. 8 by 3/8 inch cadmium or zinc coated TEKS screws with pan heads.

2.2.5 Concrete inserts, expansion anchors, powder driven fasteners, flange clips, and bolts for attachment of hanger wires to overhead construction shall have a rated capacity equal to that of the hanger wire.

2.2.6 Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.

2.3 WALL FRAMING AND FURRING MEMBERS:

2.3.1 Framing for Non-Load Bearing Interior Partitions: Fabricate framing members in accordance with ASTM C 645 from hot dip zinc coated steel, of thickness indicated. All studs shall be rolled from new steel sheet material and shall not be produced from re-rolled steel.

2.3.2 Furring Channels: Hat-shaped, ASTM C 645, from hot dip zinc coated steel minimum 0.0179 inch thick.

.1 Resilient Furring Channels: ASTM C 645, from hot dip zinc coated steel minimum 0.0179 inch thick, manufacturer's special type designed to reduce sound transmission.

2.3.3 Backing Plates: Steel, not lighter than 16 gage, of proper size to accommodate fastenings.

2.4 SUSPENSION SYSTEMS FOR PLASTER AND GYPSUM BOARD CEILINGS:

2.4.1 Channels: Cold-rolled steel, protected with rust-inhibitive paint or galvanized complying with ASTM A 653 with G60 coating.

.1 Main Runners: 1-1/2 inches deep by 7/16 inch wide flanges, weighing not less than 475 pounds per 1000 lineal feet.

.2 Furring Channels: 1-1/2 inch and 3/4 inch deep as required, by 7/16 inch flanges, weighing not less than 475 pounds and 300 pounds per 1000 lineal feet, respectively.

.3 Hat-shaped Furring Channels: ASTM C 645, minimum 0.0179 inch thick.

.4 Provide galvanized channels for exterior installations.

PART 3 - EXECUTION

3.1 INSTALLATION OF WALL FRAMING:

3.1.1 Runner Installation: Align runners accurately at the floor and ceiling. Where partitions abut underside of steel or concrete construction, maintain a minimum of 1/2 inch clearance between web of runner and underside of the steel or concrete. Restrain lateral movement of the runners with bent plate channels unless otherwise indicated. Securely anchor all other runners to the structure approximately 2 inches from runner ends and not more than 24 inches on center between ends. Attach runners to concrete with powder driven fasteners and to suspended ceilings with toggle bolts. At sound retardant partitions, set runners in two beads of acoustical sealant or two strips of acoustical tape as specified in Section 07 90 00.

3.1.2 Stud Installation: Position studs vertically and engage floor and ceiling runners. Space studs not to exceed 16 inches on center. Anchor studs located adjacent to door and window frames, partition intersection and corners. Also anchor studs carrying loads of wall mounted cabinets, shelving, handrails, ladders, toilet and urinal partitions, lavatory counters, toilet fixtures and other fixtures and equipment. Anchorage shall consist of one screw at each stud flange. Provide tripled studs at partition corners and intersections. Frame both sides of expansion and control joints with separate studs. Do not bridge expansion and control joints with components of stud system.

3.1.3 Reinforce and stiffen partitions with 3/4 inch (or larger as necessary) steel channels placed horizontally not more than 4'-6" apart. Wire-tie or bolt stiffeners to inside surfaces of studs.

3.1.4 Framing at Doors: Unless otherwise indicated, provide not lighter than 20 gage studs at each side of all doors or other openings through partitions. Over metal door frames, place a cut-to-length section of runner with a web-flange bent at each end and fastened to adjacent vertical studs with 2 screws in each flange. Position a cut-to-length stud at the location of vertical joints over door frame header extending to the ceiling. Install a horizontal stiffener channel above each door extending to engage first stud beyond each jamb stud and attach channel to each stud.

3.1.5 Blocking and Reinforcing for Wall Hung Items: Provide cut sections of not lighter than 20 gage runner channel or zinc coated steel backing plates and other items as indicated for the support of wall hung fixtures, shelving, cabinets, hand rails, and toilet accessories. Cut ends of runner and backing plates to each stud. Fasten studs carrying the weight of wall hung items to the bottom runner channel. Where the type of supplementary support is not otherwise indicated comply with the stud manufacturer's recommendations and industry standards. In each case consider the weight and load resulting from the item supported.

3.1.6 Resilient Channel Installation: Install resilient channels at right angles to the framing members spaced 24 inches on center. Attach channels through flange at each framing member with pan head screws. Install channels with mounting flange down. Locate channels 2 inches from floor and within 6 inches of ceiling. Extend channels into all corners and attach to corner framing. Cantilever channel ends no more than 6 inches. Splice channel by nesting directly over stud; screw attach through both flanges. Reinforce with screws located at both ends of splice.

3.1.7 Wall Furring: Install wall furring spaced 16 inches on center unless otherwise indicated.

3.2 INSTALLATION OF SUSPENDED CEILING FRAMING:

3.2.1 Hangers: Space 9 gage hanger wires at 48 inches on center to carry 1-1/2 inch main runners spaced 36 inches apart, or space 9 gage hanger wires at 36 inches on center to carry 1-1/2 inch main runners spaced 48 inches apart. Locate a hanger wire within 6 inches of the end of main runners. Saddle tie wires securely around main runners, using at least two turns then wrap the wire around itself in three tight wraps within 1-1/2 inches.

3.2.2 Hanger Attachment to Wood Framing: Use one of the following methods:

.1 Insert the wire into holes drilled a minimum of 3 inches above the bottom of the joist then wrap the wire around itself in three tight wraps within 1-1/2 inches.

.2 Tie the wire to a 30d nail driven at a downward slant to a penetration of at least 3 inches into the wood member and located a minimum of 5 inches above the bottom of the joist. Wrap the wire around itself in three tight wraps within 1-1/2 inches.

.3 Wrap the wire around three 12d nails driven at a downward slant to a penetration of at least 1-1/4 inches into the wood member and located a minimum of 5 inches above the bottom of the joist. Wrap the wire around itself in three tight wraps within 1-1/2 inches.

.4 Form a loop in the wire and secure with four 1-1/2 inch, No. 9 gage wire staples driven horizontally or at a downward slant into the side of joists. Place three staples near the upper end of the loop and the fourth to fasten the loose end.

3.2.3 Hanger Attachment to Concrete: Secure the wire to the steel reinforcement or to concrete inserts, by looping the wire and embedding it in the concrete, or by securing it to brackets attached to the concrete with expansion anchors or powder driven anchors.

3.2.4 Hanger Attachment to Steel Framing: Wrap the wire around or through the steel member or bolt or clip the wire to the steel member.

3.2.5 Main Runners: Install 1-1/2 inch main runners and adjust so that furring is in true and accurately level planes. Lap main runners at least 12 inches at splices, with flanges interlocked, and securely tie together with 18 gage wire, double wrapped at 2 inches from each end of splice. Do not permit runners to be let into nor contact abutting partitions. Locate main runners within 6 inches of walls to support ends of cross furring channels.

3.2.6 Cross Furring Channels for Plaster Ceilings and Soffits: Install cross furring channels at right angles to the main runners. Space cross furring channels not over 24 inches on center where main runners are spaced 36 inches apart, and not over 12 inches on center where main runners are spaced 48 inches apart. Securely attach cross furring to main runners by saddling with not less than one strand of No. 16 of two strands of No. 18 gage tie wire. Lap furring

channels 8 inches minimum at splices, with flanges interlocked, and tie with a double-wrap of tie wire within 2 inches of each end of splice.

3.2.7 Hat-shaped Furring Channels for Gypsum Board Ceilings and Soffits: Install hat-shaped furring channels at right angles to the main runners. Space hat-shaped cross furring channels not over 24 inches on center where main runners are spaced 36 inches apart, and not over 12 inches on center where main runners are spaced 48 inches apart. Securely attach hat-shaped cross furring to main runners by saddle-tying with not less than one strand of No. 16 of two strands of No. 18 gage tie wire. Lap furring channels 8 inches minimum at splices, with flanges interlocked, and tie with a double-wrap of tie wire within 2 inches of each end of splice.

3.2.8 Suspension Under Ducts and at Special Conditions: For hangers spaced from 48 inches on center to 66 inches on center (maximum), use No. 6 gage wire hangers and 2 inch channel runners. Wherever greater spans are required, provide channel framing system equal to Unistrut.

3.3 CLEAN-UP AND PROTECTION:

Perform clean-up of the premises as specified in Division 1.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Metal lath for interior and exterior plaster work, and for backing for ceramic tile.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

Aluminum Association (AA)
American Society for Testing and Materials (ASTM)
Western Lath/Plaster/Drywall Industries Association (WLPDIA)
General Services Administration Federal Specifications (Fed. Spec.)

1.3 SUBMITTALS:

1.3.1 Product Data: Submit manufacturer's certificates or other data indicating that lath and paper backing materials conform to the standards referenced. Submit descriptive data showing materials, finishes and sizes of accessories.

1.3.2 Samples: Submit 12 inch lengths of each type of aluminum screed and molding required showing finish and color.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 REGULATORY REQUIREMENTS:

1.4.1 Lathing work shall meet the requirements of the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 25 - Gypsum Board and Plaster. Fire resistive walls, partitions and ceilings shall also conform to CBC Title 24 Part 2 Chapter 7 - Fire-Resistant Materials and Construction.

1.5 DELIVERY, STORAGE, AND HANDLING:

Deliver materials in the original packages, containers or bundles bearing the name of the manufacturer, brand, type and weight. Store lathing materials at the site in a dry location, raised above the ground, and protected from weather, surface contamination, corrosion, or physical damage from construction traffic and other causes. Protect metal accessories from being bent or otherwise damaged.

PART 2 - PRODUCTS

2.1 METAL LATH:

2.1.1 General: Use hot-dip galvanized lath, ASTM A 653, designation G60, at exterior areas and in showers, drying areas and commercial kitchens. Where type of lath is not specified or indicated for a specific application, select lath to comply with the support spacing limitations of CBC Title 24 Part 2 Table 25-B. Where solid backing occurs, use self-furring lath designed to hold the lath a minimum of 1/4 inch away from the backing.

2.1.2 Expanded Metal Lath: ASTM C 847, types as follows:

.1 Exterior Vertical Areas: Self-furring diamond mesh expanded metal lath weighing not less than 3.4 pounds per square yard.

.2 Interior Vertical Areas: Flat diamond mesh expanded metal lath weighing not less than 3.4 pounds per square yard.

.3 Horizontal Areas: 3/8 inch ribbed expanded metal lath weighing not less than 3.4 pounds per square yard where supports are spaced 24 inches on center and diamond mesh expanded metal lath weighing not less than 3.4 pounds per square yard where supports are spaced 16 inches on center.

2.1.3 Woven Wire Lath: ASTM C 1032. At the Contractor's option, 1-1/2 inch mesh, 17 gage woven wire lath may be used for exterior vertical plaster surfaces. Woven wire lath will not be permitted for plaster backing for adhered brick veneer or ceramic tile.

2.1.4 Welded Wire Lath: ASTM C 933. At the Contractor's option, 2"by 2", 16 gage welded wire lath may be used for exterior vertical plaster surfaces. Welded wire lath will not be permitted for plaster backing for adhered brick veneer or ceramic tile.

2.2 WEATHER RESISTIVE BARRIER:

2.2.1 Provide backing of waterproof vegetable fiber (kraft) building paper at vertical surfaces of exterior walls and of interior partitions around showers. Paper shall comply with Fed. Spec. UU-B-790A (1), Type I, Grade B where single layer is specified and Grade D where double layer is specified. Where the paper is exposed above suspended ceilings or in attics or where wall is required to have a fire resistive rating provide flame resistant paper Sisalkraft "Pyro-Kure 604" or equal. Apply backing for ceramic tile as a separate layer. Backing for all other plaster applications may be factory attached to the back of the lath or applied as a separate layer at the Contractor's option.

2.3 ACCESSORIES:

2.3.1 Metal Accessories: Types specified below conforming to WLPDIA "Plaster and Drywall Systems Manual" Third Edition, Chapter Two. Where galvanized accessories are specified, use hot-dip galvanized steel, ASTM A 653, designation G60. Provide metal shapes used as grounds of such size and dimension as to provide for required plaster thickness.

.1 Corner Beads: WLPDIA detail 13-A Small Nose Corner Bead, with nose not exceeding 3/16 inch and expanded flanges at least 2-1/2 inches wide. Corner beads shall be fabricated of 26 gage hot-dip galvanized steel.

.2 Corner Reinforcement: WLPDIA detail 15-A or 15-B fabricated from expanded metal with large openings, from welded or woven copper bearing steel wire of minimum 18 gage, hot-dip galvanized.

.3 Casing Beads: WLPDIA detail 14-A-Square Casing Beads, fabricated of 26 gage hot-dip galvanized steel for interior locations and 0.017 inch thick zinc alloy for exterior locations. Provide beads with expanded metal flange and inverted vee at plaster edge of face flange.

.4 Cornerite: WLPDIA detail 20-A-Expanded Metal Cornerite, weighing 2.5 pounds per square yard, bent in center to form 100 degree angle, 6 inches wide. Use hot-dip galvanized at all locations where galvanized metal lath occurs.

.5 Strip Lath: WLPDIA detail 21-A-Strip Reinforcement (Expanded Metal), weighing 2.5 pounds per square yard, 6 inches wide. Use hot-dip galvanized at all locations where galvanized metal lath occurs.

.6 Base Screeds: WLPDIA detail 12-Base or Parting Screeds, fabricated of 26 gage hot-dip galvanized sheet steel.

.7 Stress Relief Joints (Expansion and Control Joints): WLPDIA detail 22-Stress Relief Control Joints, fabricated of 29 gage hot-dip galvanized steel for interior locations and 0.017 inch thick zinc alloy for exterior locations. Recesses on control joints shall be covered with removable tape or filled with rope to prevent plaster from filling the recess.

.8 Foundation Weep Screeds: WLPDIA detail 24-A, perforated type, fabricated of 0.017 inch thick zinc alloy.

2.3.2 The following PVC plastic accessories as manufactured by Plastic Components Inc., or equal, may be used in lieu of metal accessories specified above.

- .1 Corner Beads: Vinyltech No. 1.
- .2 Casing Beads: Vinyltech No. 10.
- .3 Control Joints: Vinyltech No. 20X M.
- .4 Foundation Weep Screeds: Vinyltech No. 361.

2.3.3 Aluminum Screeds and Moldings: Fabricate moldings of extruded aluminum alloy 6063-T5, 0.050 inch thick with a clear anodized finish conforming to AA designation C12C22A21. Moldings shall be of size and configuration indicated on the drawings.

.1 Available Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

Fry Reglet Corp.
Gordon, Inc.
MM Systems Corp.

2.3.4 Fasteners for Metal Lath and Accessories: Nails, staples, or screws of types and sizes required by CBC Title 24 Part 2 Table 25-C. Use manufacturer's standard clips and other attachment items for positioning and securing lath.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine wall construction to ensure that insulation, pipes, conduits, ducts, vents, supports and other items that will be concealed by the lath and plaster have been installed, inspected, tested and approved by the authorities having jurisdiction and unsatisfactory conditions have been corrected.

3.2 APPLICATION OF WEATHER RESISTIVE BARRIER:

3.2.1 Apply weather resistive barrier of building paper at vertical surfaces of all exterior walls and of interior partitions around showers and elsewhere as indicated. Over wood base sheathing, apply double layer of building paper except a single layer of building paper may be applied if paper backed metal lath is used. Over gypsum sheathing or open studing, apply single layer of building paper except where paper backed metal lath is used.

3.2.2 Apply building paper with the long dimension running horizontally. Lap horizontal joints at least 2 inches for single layer application and 19 inches for double layer application. Lap upper courses over lower courses. Locate vertical joints over supports and lap not less than 6 inches. Secure paper to framing members at intervals not exceeding 6 inches on center vertically along each framing member.

3.3 APPLICATION OF METAL LATH:

3.3.1 General: Conform to the recommendations of the WLPDIA "Plaster and Drywall Systems Manual" Third Edition, Chapter Two. Install metal lath with true even surfaces without sags or buckles.

3.3.2 Apply metal lath with long dimension at right angles to the supports, shingle fashion. Stagger ends of lath to avoid continuous joint on same support. Lap diamond mesh lath at sides not less than 1/2 inch and not less than 1 inch at ends. Lap edges of rib lath by nesting outside ribs or salvage and lap 1 inch at ends. Lap welded and woven wire lath one full mesh at sides and ends. Lap all ends at supports. Butt lath into internal angles and reinforce angle with cornerite, or extend lath around corners to nearest stud.

3.3.3 Furr out from the supports not less than 1/4 inch except where flange width of metal supports is less than one inch.

3.3.4 Secure lath to supports at intervals not exceeding 6 inches on center using nails or staples for wood framing or furring and self-drilling, self-tapping sheet metal screws or wire tying for metal studs. Tie long edges between supports with wire at intervals not exceeding 9 inches on center. Twist ends of tie wire and bend up in plane of lath.

3.3.5 Apply metal lath to concrete and masonry surfaces using powder driven fasteners of type and size recommended by the fastener manufacturer for the type and thickness of concrete or masonry.

3.3.6 Where lath is attached to horizontal wood supports, apply lath using one of the attachments set forth in CBC Title 24 Part 2 Sec. 2505.3 for interior applications and Sec. 2506.5 for exterior applications, in addition to the methods of attachment set forth in CBC Title 24 Part 2 Table No. 25-C.

3.3.7 Do not install lath continuous behind expansion or control joints.

3.3.8 When paper backed metal lath is used, separate paper and lath at lap joints and lap in such a manner that paper laps paper and lath laps lath. Cut lath at expansion and control joints but extend paper continuously behind expansion and control joints.

3.4 INSTALLATION OF LATHING ACCESSORIES:

3.4.1 General: Set plumb, level and true to line. Shim where necessary. Miter at corners. Accurately and tightly fit exposed joints. Install sections in as long a length as practicable. Fasten by wiring, at not more than 12 inches on center. Secure cornerites at 6 inch intervals at edges only, not in corner.

.1 Corner Beads: On interior plaster work, install for full length of outside corners.

.2 Corner Reinforcement: On exterior plaster work, install for full length of outside corners.

.3 Casing Beads: Install for all free edges, wherever plaster abuts against other finish material, and elsewhere as indicated.

.4 Cornerite Reinforcements: Install at inside corners, except where lath is carried around corners.

.5 Base Screeds: Install at top of base of wainscot and elsewhere as indicated.

.6 Strip Lath: Reinforce corners of openings with 9" by 24" strips of metal lath, tied to reinforcement.

.7 Stress Relief Joints: Lath shall not run continuous behind stress relief joints. If lath has been installed continuous where joints occur, cut and separate reinforcement behind expansion and control joints, however, extend paper backing continuous behind expansion joints. Space joints as indicated, or if not indicated, as approved by the Architect.

.8 Foundation Weep Screeds: Install at bottom of all exterior portland cement plaster and elsewhere as indicated. Install screeds so that the water resistive barrier and lath cover and terminate on the attachment flange of the screed.

3.4.2 Aluminum Moldings: Attach moldings securely to framing with sheet metal screws. Install moldings with tight hairline joints and mitered corners. Install drip screeds so that the water resistive barrier and lath cover and terminate on the attachment flange of the screed. Remove excess wet plaster from moldings immediately.

END OF SECTION

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Interior and exterior portland cement plaster work.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference: Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
Portland Cement Association (PCA)
Stucco Manufacturers Association (SMA)

1.3 SUBMITTALS:

1.3.1 Product Data: Submit manufacturer's certificates or other data indicating that materials conform to the standards referenced.

1.3.2 Samples: Submit 12" by 12" samples of each type of finish for review. Reviewed samples shall become the standard of comparison for cement plaster finishes.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Regulatory Requirements: Plaster construction shall meet the requirements of the California Code of Regulations (CCR) Title 24 Part 2, California Building Code, Chapter 25 - Gypsum Board and Plaster. Fire resistive walls, partitions and ceilings shall also conform to CCR Title 24 Part 2 Chapter 7 - Fire-Resistant Materials and Construction.

1.4.2 Mock-Ups: After color and texture samples have been approved and returned, construct a mock-up not less than 16 square feet in size. Use workmen, equipment and techniques proposed for use on the project. The panel may be constructed as a portion of the finished work, provided the approved panel is clearly identified for future reference. The approved panel shall become the standard of comparison for cement plaster finish work for the project.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Deliver manufactured materials in the original packages or containers bearing the name of the manufacturer and brand.

1.5.2 Keep cementitious materials dry until used. Keep materials off the ground, under cover, and clear of damp walls or other damp surfaces. Store bulk sand in a well drained area on a solid surface to prevent mixing of foreign matter.

1.6 PROJECT CONDITIONS:

1.6.1 Do not apply plaster when the ambient temperature is below 40 degrees F or when conditions indicate that the ambient temperature may fall below 40 degrees F before plaster is cured. Do not apply plaster during rainy, damp or foggy weather. Protect plaster from uneven and excessive evaporation during hot, dry weather.

1.6.2 Protect adjacent surfaces not indicated to receive plaster, with drop cloths, waterproof paper or other means to maintain them free of plaster splashes, overspray, water or debris.

1.6.3 Cooperate with various other trades in coordinating their work required in conjunction with work under this section.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Portland Cement: ASTM C 150, Type I or II.

2.1.2 Plastic Portland Cement: ASTM C 150, Type I or II, except that plasticizing agents may be added in manufacturing process not to exceed 12 percent of the total volume.

2.1.3 Additives and Admixtures:

.1 Lime: ASTM C 206.

.2 Plasticizing or air-entraining agents, when used, shall not reduce the compressive strength of the plaster more than 15 percent below the strength of the plaster without plasticizing or air-entraining.

.3 Other additives and admixtures, when used and when approved by the Architect, shall not reduce the compressive strength, tensile strength, flexural strength, impact strength or resistance to abrasion of the plaster below the strength of the plaster without the additive or admixture.

2.1.4 Sand Aggregate for Basecoats: ASTM C 897.

2.1.5 Plaster for Exterior Finish Coat: Meet the requirements of SMA "Specifications and Standards for Manufactured Stucco Finishes". Acceptable products or equal:

Expo Stucco Products; Exterior Stucco
La Habra Products Inc.; Exterior Color Coat
Omega Products Corp.; Exterior Stucco

.1 Sand contained in premixed stucco shall be silica sand of sieve size necessary to achieve the specified finish texture.

.2 Plaster shall be color selected from manufacturer's standard colors. Each separate color shall be from the same production run. All bags shall be marked to show that materials were bagged from the same production run.

2.1.6 Plaster for Interior Finish Coat: Meet the requirements of SMA "Specifications and Standards for Manufactured Stucco Finishes". Acceptable products or equal:

Expo Stucco Products, Shower Finish
La Habra Products Inc.; Shower Finish
Omega Products Corp.

2.1.7 Reinforcing Fibers: Chopped, 1/2 inch long, alkali resistant fiberglass strands specially manufactured for reinforcing portland cement plaster.

2.1.8 Water: Clean, fresh and potable.

2.1.9 Bonding Agents:

.1 Interior Work: ASTM C 631.

.2 Exterior Work: ASTM C 932.

2.2 PROPORTIONS AND MIXING:

2.2.1 Thoroughly mix materials with batch type mechanical mixer for a minimum of 2 minutes, using minimum amount of water to produce proper consistency for application. Proportion materials so that all batches are identical.

2.2.2 Use only clean tools and equipment, free from hardened or partially hardened materials. Do not retemper or use material that has partially set or is caked or lumpy.

2.2.3 Proportions for Scratch and Brown Coats: Scratch and brown coats shall be regular portland cement or portland cement/lime plaster proportioned in accordance with CCR Title 24 Part 2 Table 25-F.

.1 Add minimum 1-1/2 pounds of reinforcing fibers per sack of cement to both scratch and brown coats.

2.2.4 Thoroughly mix portland cement plaster for basecoats in the proportions specified above, with only sufficient water to attain proper consistency for application. When plastic portland cement is used, no lime or other plasticizing agents shall be added at the job site. Proper consistency for machine applied portland cement plaster may be determined by slump test. Material for slump test shall be taken from nozzle of plastering machine hose. Maximum allowable slump shall be 2-1/2 inches using a 2" by 4" by 6" slump cone.

2.2.5 Finish Coat: Factory sacked plaster shall be thoroughly mixed at project site with water to the proper consistency to achieve the approved finish texture.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine base surfaces and accessories to insure that the finished plaster surfaces will be true, level and plumb without requiring additional thickness of plaster. Verify that concrete and masonry are free of dust, loose particles, oil and other foreign matter which would adversely affect the bond of plaster coats.

3.2 SURFACE PREPARATION:

Apply a bonding agent to concrete and masonry before application of plaster. Apply the bonding agent in accordance with the manufacturer's instructions.

3.3 APPLICATION OF PLASTER:

3.3.1 General: Over metal lath apply plaster in 3 coats to a thickness of not less than 7/8 inch. Over exterior concrete and masonry apply plaster in 2 coats to a thickness of 1/2 inch except where skim coat is indicated apply plaster in one coat to a thickness of 1/8 inch. Finish interior and exterior plaster plumb, true and even within a 1/4 inch tolerance in 5 feet.

3.3.2 Application of Base Coats:

.1 Scratch coat shall be applied in a full 3/8 inch coat with sufficient material to form good keys on metal lath. Embed and fill all spaces of lath and score horizontally. Keep moist for 48 hours before second coat is applied.

.2 Brown coat shall be applied over the dampened scratch coat in a full 3/8 inch coat. Brown coat shall be brought out to grounds, straightened to a true surface and left sufficiently rough to assure adequate bond for finish. Keep moist for 48 hours and then let dry.

.3 On vertical surfaces, cold joints in brown coat shall not occur over cold joints in scratch coat. Surface shall be free from imperfections which may reflect in the finish coat.

.4 Provide scratch coats behind all wall mounted ceramic tile indicated or specified to be installed in a conventional portland cement setting bed. Refer to Section 09310. Finish brown coat shall level to within a tolerance of 1/8 inch in 10 feet.

3.3.3 Finish Application:

.1 Finish coat shall be applied not sooner than 7 days after application of brown coat. Dampen surface of brown coat to obtain uniform suction immediately before applying finish coat.

.2 Light Lace Texture. Hand apply the finish to a thickness of 1/8 inch in 2 coats. Trowel on the first coat to completely cover the base. When the surface moisture leaves, trowel apply a light second coat with a vertical motion, then knock down the surface with a trowel.

.3 Textures shall be in accordance with the WLPDIA "Plaster Textures."

.4 When practical and weather conditions are favorable, complete both coats on the same day, the second following the first when the first is sufficiently firm to receive the second coat.

3.4 PATCHING AND CLEANUP:

3.4.1 Remove plaster droppings immediately after each coat has been applied.

3.4.2 Before painting operations, patch defective work. Cut out broken or damaged plaster to straight lines with clean, sharp edges. Cut out cracks to width of not less than 1 inch. Fill areas to be patched with base material. Apply a finish coat of same material as adjoining plaster. Patched areas shall match adjoining work in finish and texture; joinings flush and smooth, so that joints between existing and new plaster will be invisible.

3.4.3 Remove plaster from beads, screeds, base and trim.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Gypsum board construction complete with accessories.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.1.3 Related Work: Non-load-bearing steel framing is specified in Section 09 1000.

1.2 REFERENCES:

The editions referenced herein of specifications and standards published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society of Testing and Materials (ASTM)
Gypsum Association (GA)
Western Lath/Plaster/Drywall Industries Association (WLPDIA)

1.3 SUBMITTALS:

1.3.1 Product Data: Submit product data for each type of product specified.

1.3.2 Certificates: Submit manufacturer's certification that products meet or exceed requirements of the referenced specifications.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Gypsum Board Construction: Meet the requirements of the California Code of Regulations (CCR) Title 24 Part 2, California Building Code, Chapter 25 - Gypsum Board and Plaster.

1.4.2 Fire-Resistive Construction: Meet the requirements of CCR Title 24 Part 2 Chapter 7 - Fire-Resistant Materials and Construction. Provide fire-resistance rated assemblies identical to those in Chapter 7 of the CCR Title 24 Part 2 or in listing of other testing agencies acceptable to the State Fire Marshal.

1.4.3 Fire Resistive Gypsum Board: Bear the Underwriter's Laboratories Inc. (UL) label or label of another organization acceptable to the State Fire Marshal.

1.4.4 Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1.4.5 Field Samples: On actual gypsum board surfaces, prepare field samples of at least 100 square feet in surface area for the applications listed below. Simulate finished lighting conditions for review of in-place unit of work.

.1 Wall surfaces indicated or specified for non-textured finish.

.2 Ceiling surfaces indicated or specified for non-textured finish.

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Deliver gypsum board and accessories in the manufacturer's original unopened containers, bundles or rolls bearing the manufacturer's name and brand designation.

1.5.2 Store materials inside the building or in other dry weather tight enclosure. Stack gypsum board flat and off the floor. Do not stack long lengths over shorter lengths.

1.5.3 Store flammable adhesives away from fire, sparks and smoking areas.

1.5.4 Handle gypsum board to prevent damage to edges, ends, and surfaces.

1.6 PROJECT CONDITIONS:

1.6.1 Maintain temperature range between 55 degrees F and 70 degrees F for a period extending from 24 hours before installation until the permanent heating system is in operation. Provide ventilation during and following adhesive and joint treatment application. Use temporary air circulators in enclosed areas lacking natural ventilation.

1.6.2 Do not apply gypsum board until insulation, pipes, conduits, ducts, vents, supports and other items that will be concealed by the gypsum board have been inspected, tested and approved by the governing authorities and unsatisfactory conditions have been corrected.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

2.1.1 Acceptable manufacturers, or equal:

Domtar Gypsum.
Georgia-Pacific Corp.
National Gypsum Co.; Gold Bond Building Products Division.
United States Gypsum Co.

2.2 MATERIALS:

2.2.1 Gypsum Board: Conform to the following standards.

.1 Fire Retardant Gypsum Board: ASTM C 36, Type X, with tapered edges, 5/8 inch thick unless otherwise indicated.

.2 Water Resistant Gypsum Board: ASTM C 630 with tapered edges, 5/8 inch thick unless otherwise indicated.

.3 Backing Board: ASTM C 442, with square edges, 5/8 inch thick unless otherwise indicated.

.7 Fire Retardant Backing Board: ASTM C 442, Type X, with square edges, 5/8 inch thick unless otherwise indicated.

2.2.2 Screws: Conform to the standards specified below for attaching gypsum board to the various substrates listed.

.1 Metal Framing, 20 Gage and Heavier: ASTM C 954.

.2 Metal Framing and Furring, 25 Gage: ASTM C 1002, Type S.

.3 Wood Framing: ASTM C 1002, Type W.

.4 Gypsum Backing Board: ASTM C 1002, Type G.

2.2.3 Nails for Attaching Gypsum Board to Wood Framing: ASTM C 514.

2.2.4 Resilient Channels: Fabricate resilient furring members in accordance with ASTM C 645, from hot dip zinc coated steel minimum 0.0179 inch thick. Provide manufacturer's special type designed to reduce sound transmission. Acceptable products or equal:

Gold Bond Building Products; Resilient Furring Channels
U.S. Gypsum Co.; RC-1 Resilient Channels

2.2.5 Metal Trim: ASTM C 1047, fabricated from hot-dip zinc-coated sheet steel.

2.2.6 Taping and Finishing Materials: ASTM C 475, all purpose type.

.1 Joint Tape: Paper reinforcing tape.

.2 Joint Compound: Factory-packaged vinyl-based, ready-mixed formulation, all-purpose type formulated for both taping and topping compounds.

2.2.7 Acoustical Sealant: Specified in Section 07 90 00.

2.2.8 Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

PART 3 - EXECUTION

3.1 EXAMINATION:

Before applying gypsum board ensure that corners and framing are plumb, true and solid and that framing members are properly spaced. Edges and ends of board shall have solid bearing. Do not start work until deficiencies have been corrected. Start of work of this section constitutes acceptance of the surfaces.

3.2 INSTALLATION OF GYPSUM BOARD:

3.2.1 Applications:

- .1 Use water resistant gypsum board where indicated.
- .2 Use backing board or regular gypsum board for base layer for 2 layer applications. Use Type X backing board or Type X gypsum board where required for fire rating.
- .3 Use fire retardant gypsum board where indicated or required to achieve fire rated partitions and ceilings.
- .4 Use Type X or regular gypsum board in all locations not otherwise indicated or specified.

3.2.2 General: Install and finish gypsum boards to comply with ASTM C 840 and GA-216.

- .1 Use gypsum board of maximum practicable lengths to minimize end joints. Stagger end joints when they occur. Locate end joints as far as possible from the center of walls and ceilings.
- .2 Install gypsum boards in moderate contact, without forcing them in place. Do not place square or cut ends or cut edges against tapered edges.
- .3 Except for face layer of double layer construction, support ends and edges of gypsum boards on framing or furring members. Joints on opposite sides of the same partition shall not occur on the same stud.
- .4 Cover both faces of steel stud partition framing with gypsum board in concealed spaces above ceiling where required for sound, fire, air, or smoke ratings.
- .5 Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board over wood framing with floating internal corner construction.

3.2.3 Fastening: Locate fasteners not less than 3/8 inch nor more than 1/2 inch from edges and ends of gypsum board. Drive fasteners perpendicular to the gypsum board surface with heads set slightly below the gypsum board surface for finish layers and even with the surface for base layers. Attach gypsum board starting from the center of each panel and proceeding toward the outer edges. Fasten gypsum board in place with screws over metal framing and with nails or screws over wood framing.

3.2.4 Sound Rated Partitions: Where sound rated partitions are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of partitions. Acoustical sealant specified in Section 07 90 00. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

3.2.5 Nonrated Single Layer Construction:

- .1 Apply gypsum board with the long dimension at right angles to ceiling framing and at right angles or parallel to wall framing members. Use maximum-length panels to minimize end joints.
- .2 Apply ceiling panels before wall/partition board application to the greatest extent possible.

.3 Attach gypsum board with nails spaced 7 inches on center for ceilings and 8 inches on center for walls or screws spaced 12 inches on center for ceilings and 16 inches on center for walls. Use 5d nails for 1/2 inch thick gypsum board and 6d nails for 5/8 inch thick gypsum board. Use 1 inch long screws for metal framing and furring and 1-1/4 inch long screws for wood framing.

3.2.6 Nonrated Double Layer Construction: Provide one of the following methods at the Contractor's option.

.1 Mechanically Fastened Face Layer: Apply base layer with the long dimension at right angles to the framing members. Attach the base layer with screws spaced 24 inches on center or nails spaced 16 inches on center. Use 5d nails for 1/2 inch thick gypsum board and 6d nails for 5/8 inch thick gypsum board. Use 1 inch long screws for metal framing and 1-1/4 inch long screws for wood framing. Apply face layer with long dimension at right angles to the base layer. Attach the face layer with nails 16 inches on center or screws 24 inches on center. Use 7d nails or 1-5/8 inch long screws.

.2 Adhesive Applied Face Layer: Apply base layer with the long dimension at right angles to the framing members. Attach the base layer with nails or screws of sizes and spacings as specified for single layer construction. Apply the face layer with long dimension perpendicular to the base layer. Laminate the face layer to the base layer with all purpose joint compound applied to the back of the panel with a notched spreader. Hold the face layer in position until adequate bond is achieved using temporary fasteners or bracing. Remove temporary fasteners or bracing and fill all holes with joint compound as specified herein.

3.2.7 Rated Fire Resistive Partitions: Install and fasten gypsum board in accordance with CCR Title 24 Part 2 Table 7-B.

3.2.8 Resilient Channels: Install resilient channels at right angles to the framing members. Attach channels through alternate flanges at each framing member with nails or screws. Nails shall be 1-1/4 inch GWB-54 type. Screws shall be 1 inch long for metal framing and 1-1/4 inch long for wood framing. Splice channels by nesting directly over framing members and attaching through each resilient channel flanges with one fastener.

3.2.9 Metal Trim: Attach corner and edge trim and control joints with screws spaced not more than 9 inches on center.

.1 Install the gypsum board metal corner trim where indicated and at vertical and horizontal external corners and angles.

.2 Install metal edge trim where indicated and at junctions of gypsum board and walls of other materials and where there are exposed edges.

.3 Provide control joints where indicated on the drawings. If no control joints are indicated, provide joints to ensure that unbroken wall surfaces are limited to 30 feet in length and unbroken ceiling surfaces are limited to 2500 square feet or 50 feet in either direction.

3.2.10 Edge Sealing: Cut edges, utility holes, and joints of water resistant gypsum board shall be treated with the gypsum board manufacturer's recommended waterproof sealant before installation.

3.2.11 Tolerances: Gypsum board surfaces shall have a maximum variation of 1/8 inch in 10 feet when a straight edge is laid on the surface in any direction and no measurable variation in any 2 foot direction.

3.3 TAPING AND FINISHING:

3.3.1 Tape and finish joints, corners, fastener heads, and other imperfections in accordance with the manufacturer's specifications and recommendations to provide a smooth finish.

3.3.2 Reinforce joints, wall and ceiling angles, and inside vertical corners with tape embedded in joint compound. Finish joints with not less than 2 applications of joint compound, allowing each application to dry thoroughly and sanding between coats as required.

3.3.3 Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish in accordance with GA-214.

.1 Level 1: Not Used.

.2 Level 2: Not Used.

.3 Level 3: Not Used.

.4 Level 4: Not Used.

.5 Level 5: Provide for gypsum board surfaces indicated to receive non-textured finish and gloss or semi-gloss enamels. Where Level 5 gypsum board finish is indicated or specified, embed tape in finishing compound plus 2 separate coats applied over joints, inside angles, fastener heads, and accessories using ready-mixed, drying type, all-purpose taping compound, plus a thin skim coat of joint compound over the entire gypsum board surface. After drying, lightly sand or otherwise treat the surface of the compound to provide a smooth even surface free of porosity or other surface variations.

3.3.4 Treat external corners, edges, and ends with metal beads and edge trim. Finish with 3 coats of joint compound and feather out between 8 inches and 10 inches from the nose.

3.3.5 The final application of compound and sanding shall leave all gypsum board surfaces uniformly smooth and in condition to receive specified finish.

3.4 REPAIR, CLEAN-UP AND PROTECTION:

3.4.1 Repair fastener pops by driving a new fastener approximately 1-1/2 inches from the fastener pop and reset the popped fastener. When face paper is punctured, drive a new fastener approximately 1-1/2 inches from the defective fastener. Fill damaged surfaces with compound.

3.4.2 Upon completion of the work, remove from adjacent surfaces, overspray, splatter and daubs of taping and finish compound and textured finishes. Remove tools, equipment, unused material and cuttings and leave the work in a clean orderly manner.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Ceramic floor and wall tile work, including related accessories, waterproofing, mortar and grout.

1.2 REFERENCES:

The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American National Standards Institute (ANSI)
American Society for Testing and Materials (ASTM)
Tile Council of America (TCA)

1.3 RELATED SECTIONS:

1.4 SUBMITTALS:

1.4.1 Product Data: Submit manufacturer's data on manufactured mortars and grouts including instructions for mixing and applying.

1.4.2 Samples: Where colors and patterns are not specified, submit one set of samples of each type of tile specified showing the manufacturer's full range of standard colors and patterns for final selection. Where colors and patterns are specified submit 2 samples of each color type and shape of tile and trim.

1.4.3 Submittal procedures and quantities are specified in Division 1.

1.5 QUALITY ASSURANCE:

Requirements for Physically Disabled: Provide ceramic tile flooring meeting the slip resistant requirements of California Code of Regulations (CCR) Title 24 Part 2; and ADA Accessibility Guidelines for Buildings and Facilities, dated June 26, 1991 as amended April 5, 1993 and January 18, 1994, and July 2004.

1.6 DELIVERY, STORAGE AND HANDLING:

1.6.1 Delivery:

.1 Deliver tile, cement, lime, mortar, and grout to the project site in unopened containers, labeled with the manufacturer's name and brand designation.

.2 Grade seal tile cartons by the manufacturer in accordance with ANSI A137.1.

.3 Include hallmarks on labels for dry set and latex mortars certifying compliance with ANSI A118.1 and A118.4 respectively.

1.6.2 Storage: Store tile and accessory materials in dry, weather tight enclosures. Store sand in a well drained area on a solid surface to prevent mixing with foreign matter.

1.7 PROJECT CONDITIONS:

Set and grout tile when the temperature is at least 50 degrees F and rising and temperature of the substrate does not exceed 100 degrees F.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Ceramic Tile: "Standard" grade units meeting the requirements of ANSI A137.1. Deliver tile in sealed cartons, identified with a Master Grade Certificate, on standard form of the Tile Council of America, certifying grades, type and qualities of tile furnished.

.1 Wall Tile: Smooth surface texture and matte glaze. Provide patterns, sizes and colors as selected by the Architect, or indicated on Drawings.

.2 Floor Tile: Unglazed porcelain tile with cushion edge. Floor tile shall have a coefficient of friction equal to, or greater than, 0.6. Provide pattern and color as selected by the Architect, or indicated on Drawings.

.3 Accessories: Provide all trim necessary to produce coved bases, Provide cove base matching floor tile.

2.1.2 Mortar, Setting Bed, and Grouting Materials:

.1 Cement: ASTM C 150, Standard Type I or II portland cement, low alkali.

.2 Lime: ASTM C 207, Type S, hydrated.

.3 Sand: ASTM C 144, natural sand, clean and graded.

.4 Water: Fresh, clean and potable, and free from such amounts of mineral and organic substances as would adversely affect the hardening of cement mortar.

.5 Reinforcing Wire Fabric: ASTM A 185 or ASTM A 497, 2 by 2 inch fabric, 16/16 wire, 3 by 3 inch fabric, 13/13 wire or 1.5 by 2 inch fabric, 16/13 wire.

.6 Cleavage Membrane: One of the following:

a. Polyethylene Sheeting: ASTM C 171, 4 mils thick

b. Roofing Felt: ASTM D 226, 15 pound type.

c. Reinforced Asphalt Paper, Duplex Type: ASTM C 171.

.7 Dry Set Mortar: ANSI A118.1.

.8 Latex Portland Cement Mortar: ANSI A118.4. Provide acrylic type latex for exterior applications.

.9 Commercial Portland Cement Grout: ANSI A118.6, factory sanded, color as selected by the Architect.

.10 Dry Set Grout: ANSI A118.6, sanded or unsanded as specified, color as selected by the Architect.

.11 Latex Additive for Grout: ANSI A118.6. Provide acrylic type latex for exterior applications.

2.1.3 Thresholds: Provide marble thresholds having rounded corners and sand rubbed finish.

2.1.4 Waterproof and Anti-Fracture Membranes: Provide one of the following waterproof membranes manufactured specifically for use with thin set ceramic tile installations.

.1 Glass or Polyester Mat Reinforced Latex Mastic Membranes: Acceptable products or equal:

Laticrete International Inc.; Laticrete #9235
Mer-Kote Products Inc.; Mer-Krete BFP

.2 Trowel Applied Polyurethane Waterproofing Membrane and Tile Setting Adhesive: Acceptable products or equal:

Bostik/Hydroment; Ultra-Set
Mapei Corp.; Planicrete W

.3 Chlorinated Polyethylene Sheet with Non-woven Polyester Mats Laminated to Both Faces: Acceptable products or equal:

Compotite Corp.; Composeal Gold
Dal-Tile Corp.; Dal-Seal Gold
The Noble Co.; Nobleseal TS

2.1.6 Mortar Materials – Thin Set Beds:

.1 Portland Cement with latex additive, thin set, complying with ANSI A118.4.

.2 Quantity: As recommended by latex additive manufacturer.

.3 Acceptable Products:

Laticrete; Latex Thin Set Mortar Additive #4237
Custom Building Products; CreteMix Mortar; or CustomCrete Latex Mortar with site mixed mortar.

2.2 MIXES:

2.2.1 Portland Cement Mortar Setting Beds: Proportion and mix mortar for setting beds in accordance with ANSI A108.1.

2.2.2 Dry-Set and Latex Portland Cement Mortar Setting Beds: Mix mortar in accordance with ANSI A108.5 and the manufacturer's instructions.

2.2.3 Dry Set and Commercial Portland Cement Grouts: Mix grout in accordance with ANSI A108.10 and the manufacturer's instructions.

2.2.4 Sand-Portland Cement Grout: Proportion and mix grout in accordance with ANSI A108.10.

2.2.5 Latex-Portland Cement Grout: One of the grouts specified above mixed in accordance with ANSI A108.10 and the latex manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION:

3.1.1 Examine floor substrates to receive tile, setting beds and accessories before tile installation begins to assure that substrates are level or uniformly sloped to drain within 1/4 inch in 10 feet for portland cement mortar method and 1/8 inch in 10 feet for dry set or latex portland cement mortar methods.

3.1.2 Examine wall substrates to receive tile, setting beds and accessories before tile installation begins to assure that substrates are plumb and in a true plane within 1/4 inch in 8 feet for portland cement mortar method and 1/8 inch in 8 feet for dry set or latex portland cement mortar methods.

3.1.3 Make sure grounds, anchors, plugs, hangers, bucks, bath tubs, floor drains, and shower receptors to be built into the tile have been installed.

3.1.4 Check to assure that waterproof membranes and rough-ins for plumbing, mechanical and electrical work behind the tile have been installed and tested.

3.1.5 Do not proceed with installation of tile work until such deficiencies have been corrected.

3.2 WATERPROOF MEMBRANE INSTALLATION:

3.2.1 Apply one of the following types of thin set waterproofing membranes extended at least 6 inches up on side walls.

.1 Glass Fiber Fabric Reinforced Latex Membrane: Apply a liberal coat of latex mastic to concrete with a trowel, brush, or roller. While mastic is still wet, unroll glass fiber fabric onto the coated surface lapping seams at least 2 inches. Apply a second coat of mastic so as to completely cover and seal the fabric. Allow the membrane to cure overnight or until it is sufficiently hard to take foot traffic before installing tile in latex portland cement mortar.

.2 Polyurethane Membrane: At intersections with walls, trowel on a 30 mil flashing coat of polyurethane material extending 5 inches on each side of the intersection. Promptly embed woven glass fiber fabric and trowel on a second 30 mil thickness of polyurethane material. After 48 hours, trowel on a 30 mil thickness of polyurethane material over as much area as can be tiled promptly. Set tile firmly in the regular manner and beat it into the ribs of waterproofing material. Maintain a continuous coating from one working area to the next to ensure continuity of the waterproof membrane.

.3 Chlorinated Polyethylene Membrane: Install sheet membrane in latex portland cement mortar mixed to the consistency recommended by the sheet membrane manufacturer. Roll the sheet into the mortar using a rubber covered roller or other means that will not damage

the membrane and will achieve 100 percent coverage of the substrate and full penetration of the mortar into the fabric facing on the sheet membrane. Turn the membrane up the wall not less than 6 inches and cut and fold the corners as recommended by the sheet manufacturer. Extend sheet membrane into clamping of floor drains and seal with manufacturer's recommended sealant.

3.3 TILE INSTALLATION:

3.3.1 Lay out tile work so that, as far as possible, no tile less than half full size occurs. Lay floors out from center lines of rooms so that all major adjustments are made at walls. Lay out tiles on walls so that fields and patterns center on floor tile.

3.3.2 Cut and drill without marring the tile. Rub cuts smooth with a fine abrasive stone. Set no cut edge against fixtures, cabinets, or other tile without a joint at least 1/16 inch wide. Whenever possible, turn cut edges away from the adjoining wall. Fit tile around electric outlets, plumbing pipes, fixtures and fittings close enough to permit standard plates and collars to overlap the tile.

3.3.3 Keep tile dry while in packages. Take precautions to prevent staining of tiles before they are set. Do not install stained tile.

3.3.4 Floor Tile: Install tile over glass mesh mortar units specified herein using, the thin-set mortar method in accordance with ANSI A108.5 and TCA Handbook Detail F122.

3.4.5 Wall Tile: Install tile using the conventional Portland cement mortar method in accordance with ANSI A108.1 and TCA Handbook Detail W221.

3.4 EXPANSION JOINTS:

3.5.1 Expansion and Control Joints: Provide expansion and control joints in tile work where indicated. Where joint locations are not indicated, provide joints spacing in accordance with TCA Handbook Detail EJ171. Submit plan showing location of joints for approval.

3.5 TILE INSTALLATION & GROUTING – THIN SET METHOD, FLOORS & WALLS:

3.6.1 Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered. Maintain 90 percent coverage on back of tile and fully bed all corners.

3.6.2 Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.

3.6.3 When installing large tiles, ceramics or mosaics, trowel small quantity of mortar or adhesive on to back of each tile or sheet of tiles.

3.6.4 Set tiles in place and rub or beat with small beating block.

3.6.5 Beat or rap tile to ensure proper bond and to level surface of tile.

3.6.6 Align tile to show uniform joints and allow to set until firm.

3.6.7 Clean excess mortar or adhesive from surface of tile and wet cheese cloth (not a sponge) while mortar is fresh.

3.6.8 Sound tile after setting. Replace hollow sounding tiles.

3.6.9 Grouting:

.1 Allow tiles to set a minimum of 48 hours before grouting.

.2 If bonding materials are rapid setting, follow manufacturer's recommendations.

.3 Install in accordance with ANSI A108 and grout manufacturer's recommendations.

.4 Pack joints full and free before mortar takes initial set.

.5 Clean excess grout from surface with wet cheesecloth as work progresses. Do not use hydrosponges.

.6 Cure after grouting by covering with kraft or construction paper for 72 hours.

.7 Install sealant in vertical wall joints and interior corners.

3.6 CLEANING AND CURING:

3.6.1 Clean off excess grout before it has fully set using clean sponges and water. Sponge and wash tiles thoroughly and then polish with clean, dry cloths. Use no acids or abrasive soaps on tile, except as approved by tile manufacturer. If difficulty is encountered in removing grout or grout films use tile cleaner as recommended by the grout manufacturer with a nylon scrubbing pad. Replace ceramic tile having stains or discolorations that are not removable with clean water or tile cleaner.

3.6.2 Apply non-staining laminated and reinforced kraft paper having a bituminous or latex binder over floor tile as soon as grouting, pointing and cleaning is completed. Lap the sheets at least 4 inches and seal the laps against the escape of moisture. Leave curing paper in place until job is ready for final cleaning, at least 7 full days. Keep traffic off floors during the curing period, 3 days.

END OF SECTION

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Acoustical ceiling, including acoustical tile.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the organizations, listed below and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
Acoustical Insulation Manufacturer's Association (AIMA)
General Services Administration Federal Specifications (Fed. Spec.)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit shop drawings showing reflected ceiling plans; location of acoustical ceilings and suspension systems; location of light fixtures, diffusers, speakers and other exposed to view items; list of materials; dimensions, jointing, method of hanger attachment, fastenings and other pertinent information. Shop drawings may be in the form of revised copies of the Architect's reflected ceiling plan showing any proposed changes from the layout indicated.

1.3.2 Product Data:

.1 Submit manufacturer's catalog cuts, specifications, and other data for each component of the acoustical ceiling systems as necessary to demonstrate compliance with these specifications.

.2 Submit copies of the suspension system manufacturer's current International Code Council Evaluation Service Report (ICC ESR).

1.3.3 Samples: Submit the following samples for review:

.1 12" by 12" samples of each type of acoustical units to be used in the work.

1.3.4 Submittal procedures and quantities are specified in Division 1.

1.4 REGULATORY REQUIREMENTS:

1.4.1 Flame Spread Rating: Provide acoustical ceiling units bearing the label of Underwriters' Laboratories, or other testing agency acceptable to the State Fire Marshal, indicating that the units provide the specified flame spread rating in accordance with California Building Code (CBC) Section 804, Table 8-B.

.1 Flame Spread: 25 or less.

1.4.2 Smoke Density Rating: Per California Building Code (CBC) Section 802. Smoke Developed: 450 or less.

1.4.3 Fire Resistive Ceiling Systems: Meet the requirements of the CCR, Title 24 Part 2, California Building Code, Chapter 7, Fire-resistant Materials and Construction, for the fire resistive ratings indicated. Label all components of fire resistive ceiling systems with the label of Underwriters' Laboratories, or other testing agency acceptable to the State Fire Marshal, indicating that they are identical to components tested for the fire resistance ratings indicated.

1.5 DELIVERY, STORAGE AND HANDLING:

1.5.1 Deliver materials to the project in original unopened packages bearing the manufacturer's name, brand designation, and label verifying compliance with these specifications. Store materials in properly protected and dry storage area.

1.5.2 Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed.

1.6 PROJECT CONDITIONS:

Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent continuously from 24 hours before installation until 24 hours after completion of work.

1.7 SCHEDULING:

Wet operations such as plastering, concrete and masonry work shall be completed and dry before installation of acoustical ceilings. Mechanical, electrical and other work above the ceiling line shall be completed and approved before start of acoustical ceiling installation.

1.8 EXTRA MATERIALS:

Deliver stock of maintenance material to the Owner. For each 200 acoustical ceiling units installed, furnish one full size acoustical ceiling unit(s) matching products installed, packaged with protective covering for storage, and identified with appropriate labels.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING UNITS:

2.1.1 Acoustical Materials: ASTM E 1264, with features as specified below. Furnish each type specified from one manufacturer, with the color and texture identical throughout.

2.1.2 Acoustical Lay-in Panels:

.1 Type: Noncombustible mineral fiber with a factory applied washable white finish that can be repainted repeatedly without loss of sound absorption efficiency.

- .2 Form: Nodulated, cast, or molded.
- .3 Light Reflection Factor: 0.75 minimum.
- .4 Flame Spread and Smoke Developed Ratings: 0-25 flame spread and 0-15 smoke developed in accordance with ASTM E 84.
- .5 Noise Reduction Coefficient: Minimum 0.65.
- .6 Size: 24" by 24" by 3/4" thick.
- .7 Attenuation Factor: 35-39 DB; 11 frequency average.
- .8 Edge Detail: Match existing.
- .9 Pattern: Match existing.
- .10 Acceptable products or equal:
 - Armstrong World Industries
 - Celotex Corp.
 - U.S.G. Interiors Inc.

2.1.3 Acoustical Lay-in Panels:

- .1 Type: Noncombustible mineral fiber with a factory applied washable white finish that can be repainted repeatedly without loss of sound absorption efficiency.
- .2 Form: Water Felted.
- .3 Light Reflection Factor: 0.75 minimum.
- .4 Flame Spread and Smoke Developed Ratings: 0-25 flame spread and 0-15 smoke developed in accordance with ASTM E 84.
- .5 Noise Reduction Coefficient: Minimum 0.50.
- .6 Size: 24" by 48" by 5/8" thick.
- .7 Attenuation Factor: 35-39 DB; 11 frequency average.
- .8 Edge Detail: Match existing.
- .9 Pattern: Match existing.
- .10 Acceptable products or equal:
 - Armstrong World Industries;
 - Celotex Corp.
 - U.S.G. Interiors Inc.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine surfaces and conditions affecting proper installation of the materials, and report defects in materials or surfaces to which acoustical tile is applied. Do not start work until deficiencies have been corrected. Start of work of this section constitutes acceptance of the surfaces.

3.2 INSTALLATION OF CEILING SYSTEMS:

3.2.1 Place units as indicated on the shop drawings. Install with joints true and straight and junctures with ceilings, walls and openings neat and tight. Completed work shall present a smooth plane and level surface, free from unevenness, edge or corner offsets, cupping, scratches and other imperfections.

3.2.2 Perform all cutting required for fixtures, pipes and other work passing through acoustical tile and panels. Neatly and tightly fit units to such work and adjoining work. Fit border units neatly and tightly against abutting surfaces. Replace loose and damaged tiles and panels when directed. Touch-up all damaged finishes. Leave all surfaces clean and free from marking and other disfigurement.

3.3 INSTALLATION OF ACOUSTICAL UNITS:

3.3.1 Acoustical Tile: Install in coordination with suspension system. Place splines into kerfed edges. Fit adjoining tile to form flush, tight joints. Scribe and cut for accurate fit at borders and around penetrating work. Hold tile field in compression by inserting leaf-type spring steel spacers between tile and moldings, spaced 12 inches on center.

.1 Install tile with pattern running in direction that matches existing.

3.3.2 Adhesive Application of Acoustical Tile: Install by cementing to substrate using amount of adhesive and procedure recommended by tile manufacturer. Install splines in joints between tiles and level to 1/8 inch in 12 feet tolerance. Maintain tight butt joints, aligned both directions. Scribe and cut tile to fit accurately at ceiling edges and penetrations.

3.4 CLEAN-UP:

Replace loose and damaged tile and panels when directed. Touch-up all damaged finish. Leave all surfaces clean and free from markings and other disfigurements. Remove all debris resulting from the work of this section.

END OF SECTION

RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Luxury vinyl tile flooring, complete with wall base, edge trim, and other accessories.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
General Services Administration Federal Specifications (Fed. Spec.)

1.3 SUBMITTALS:

1.3.1 Product Data: Submit manufacturers product data for each type of resilient wall base and accessory specified.

1.3.2 Samples:

.1 Luxury Vinyl Tile: Submit one square yard samples of each different color and pattern of vinyl flooring.

.2 Accessories: Submit 12 inch long samples of each different color and pattern of wall base, stair treads and risers, and edge trim.

1.3.3 Manufacturer's Installation Procedures: Submit a current copy of the flooring manufacturer's recommended standard installation procedure for each type of flooring material.

1.3.4 Manufacturer's Maintenance Instructions: Submit to the Owner, a current copy of the flooring manufacturer's printed recommendations for maintenance methods and products for each type of flooring material.

1.3.5 Submittal procedures and quantities are specified in Division 1.

1.4 QUALITY ASSURANCE:

1.4.1 Regulatory Requirements. The quantity of volatile organic compounds (VOC) used for flooring installation shall not exceed the limits permitted under the current regulations of the San Diego County Air Pollution Control District.

1.4.2 Requirements for Physically Disabled: Provide resilient flooring meeting the slip resistant requirements of California Code of Regulations (CCR) Title 24 Part 2; and ADA Accessibility Guidelines for Buildings and Facilities, dated June 26, 1991 as amended April 5, 1993 and January 18, 1994, and July 2004.

1.4.3 Resilient flooring shall have a coefficient of friction of at least 0.6 per ASTM D 2047. Special warnings for disabled persons shall comply with CBC Sections 1133B.8.3 and 1133B.8.4

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Delivery: Deliver materials to the site in the manufacturers original unopened containers clearly labeled with manufacturer's name, brand designation and production run number.

1.5.2 Storage and Handling: Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 degrees F and 90 degrees F. Store on flat surfaces. Move flooring and installation accessories into spaces where they will be installed at least 48 hours before installation at a minimum temperature of 70 degrees F.

1.6 PROJECT CONDITIONS:

1.6.1 Maintain spaces in which flooring is to be installed between 70 degrees F and 90 degrees F for at least 48 hours before, during, and 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F.

1.6.2 Close spaces to traffic while installing floor covering.

1.6.3 Provide adequate ventilation to remove moisture and fumes from the area.

1.7 EXTRA MATERIALS:

Furnish an additional one percent of each different sheet vinyl flooring; and 10 linear feet for each 500 linear feet or fraction thereof, in roll form of resilient wall base; furnished on the project, to the Owner for repair purposes. Include the cost of this material in the contract price. Select material from the same run number as the material installed. Identify materials as to location used.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Sheet Vinyl Flooring: Provide one of the following at the Contractor's option:

.1 Filled Sheet Vinyl Flooring: Fed. Spec. L-F-475A (2), Grade A, Type II, 0.085 inch thick, with uniform design and color throughout the thickness of the sheet. Colors and patterns as selected by the Architect from the manufacturer's standard colors and patterns. Acceptable products or equal:

Armstrong World Industries, Inc.; Luxury Vinyl Tile

2.1.2 Resilient Wall Base: Fed. Spec. SS-W-40A, Type I (Rubber) 6 inches high unless otherwise indicated by 1/8 inch thick. Colors as selected by the Architect from the manufacturer's standard colors and patterns. Provide premolded base units at external and internal corners. Acceptable manufacturers or equal:

Azrock Industries Inc.
Burke Flooring Products
Flexco Company
Johnsonite Div.
Mercer Products Co., Inc.
Roppe Corporation

2.1.3 Edging Strips: Molded vinyl, 1-1/2" by 1/8" thick, tapered, meeting the requirements of Fed. Spec. SS-T-312B, Type II, colors as selected by the Architect from manufacturer's standard to match flooring.

2.1.4 Adhesives and Primers: Products specified or recommended by the manufacturer of the particular resilient flooring furnished. Provide cutback type adhesives where required by manufacturer of flooring.

2.1.5 Floor Patch and Leveling Compound: Products manufactured specifically for the purpose as recommended by the manufacturer of the particular resilient flooring furnished.

.1 Where floors require extensive leveling or repair necessitating several thicknesses of leveling compound.

.2 Acceptable products or equal:

Industrial Products, Inc.; Vi-Tex Leveling Compound
Armstrong Floor Div.; Underlayment S-180

2.1.6 Moisture Vapor Dispersant: Acceptable product or equal:

American Pacific Associates; Sealflex
Floor Seal Technology; Fiberseal
Creteseal; CS2000

PART 3 - EXECUTION

3.1 EXAMINATION:

Before installing resilient flooring, wall base, or other accessories, examine substrates to ensure that they are dry, clean of paint spots, oil, grease, wax, bond-breaking or curing compounds, and other materials whose presence would interfere with bonding of adhesive. Subsurface shall also be free from trowel marks, pits, dents, or other unusual roughness and sharp edges that would cause protrusions and bulges after resilient material is laid. Examination shall include bond moisture and alkali testing of concrete subfloors. Correct defective surfaces or conditions preventing proper execution of the work. Starting of work without such correction will be considered acceptance by the Contractor of the surface involved.

3.2 SURFACE PREPARATION:

3.2.1 Before application of resilient flooring, test floor slab in accordance with ASTM F 1869 using the calcium chloride crystal test. If slab has a moisture vapor emission in excess of 3.0 pounds per 1000 square feet in a 24 hour exposure period, apply a moisture vapor dispersant to top of slab. Apply in accordance with manufacturer's directions.

3.2.2 Fill minor joints, cracks, or depressions in concrete slabs and subfloors with floor patch. Where floors require extensive leveling or repair necessitating several thicknesses, use leveling compound. Allow 24 hours drying time for leveling compound before applying resilient flooring.

3.2.3 Do not begin installation until work of other trades in the area, including painting, has been completed.

3.2.4 Apply concrete slab primer, if recommended by flooring manufacturer, before applying adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION:

3.3.1 Sheet Vinyl Flooring:

.1 Sheet vinyl flooring shall be installed by a representative of the manufacturer using installation method recommended by the flooring manufacturer for the type of flooring and the substrate conditions indicated.

.2 Lay sheet flooring to provide as few seams as possible. Match edges for color shading and pattern at seams. Adhere sheet flooring to substrates using method approved by flooring manufacturer. Produce completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Neatly scribe around pipes, fixtures, and equipment to form tight joints. Avoid cross seams.

.3 Heat Welded Seams: Heat weld seams in vinyl sheet flooring with manufacturer's special routing tool and heat weld with vinyl thread in accordance with manufacturer's instructions. Neatly scribe around pipes, fixtures, and equipment to form tight joints free of gaps.

.4 Integral Vinyl Base: Install fillet strip to form perfect cove at base. Extend sheet vinyl up walls to height indicated. Trim top edge of base with metal binding strip. Install metal end stops where required. Extend sheet vinyl up toe space of cabinets in same manner specified for walls.

.5 Hand roll sheet vinyl flooring in both directions from center out to embed floor coverings in adhesive and eliminate trapped air. At walls, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument.

3.3.2 Resilient Wall Base: Install base on all walls as indicated or scheduled, and on columns, pilasters, fronts, toe space, and backs of casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable.

.1 Use adhesive recommended by manufacturer of base. Apply adhesive to both substrate and base and press firmly into place. Maintain top edge at true horizontal line. Adhere

wall base to substrate throughout length of each piece with base in continuous contact with horizontal and vertical substrates. Toe of coved base shall contact floor for entire length. Closely butt end joints, top edge, and faces flush. Remove excess adhesive.

.2 On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

.3 Install one piece molded corners at both inside and outside corners; do not cut standard base to obtain job base built corners. Install before installing straight pieces.

.4 Where pre-molded inside corners are not available, form inside corners on job from straight pieces of maximum lengths possible by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce snug fit to substrate.

3.4 CLEANING, SEALING AND PROTECTION:

3.4.1 Until floors are well seated, at least 72 hours, at a maintained temperature of not less than 70 degrees F, keep traffic to an absolute minimum, and under no conditions allow fixtures, equipment, trucks, or similar heavy traffic.

3.4.2 After flooring has been installed for at least 72 hours, strip paraffin from face of rubber studded flooring.

3.4.3 Cleaning and Sealing: Just before turning building over to the Owner, clean resilient flooring and base thoroughly in accordance with the manufacturer's recommendations. After cleaning, apply one coat of approved nonskid finish to vinyl composition tile floors and polish with a mechanical buffer.

3.4.4 For the entire period between installation of resilient flooring and acceptance of the Work by the Owner, protect of floors from damage using methods recommended by the flooring manufacturer.

END OF SECTION

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RUBBER ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Rubber athletic flooring, consisting of a 5mm underlayment with a 3.2mm EPDM surface wear layer.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 SUBMITTALS:

1.2.1 Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each flooring material required. Include certification indicating compliance of materials with requirements. Submit manufacturer's written maintenance instructions.

1.2.2 Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors, patterns, and textures.

1.2.3 Samples: Submit one sample of specified flooring on flat particle board not less than 12" by 12" in size showing approximate applied thickness, quality of work, texture and color.

1.2.4 Submittal procedures and quantities are specified in Division 1.

1.3 QUALITY ASSURANCE:

1.3.1 Installer Qualifications: Engage an installer who has successfully completed within the last 3 years at least 3 flooring applications similar in type and size to that of this project.

1.3.2 Manufacturer Qualifications: Obtain necessary flooring materials including adhesives, from a single manufacturer with not less than 5 years of successful experience in supplying principal materials for work of type specified in this section. Manufacturer capable of providing field service representation during construction and approving application method.

1.3.3 Pre-Installation Meetings and Testing:

.1 Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's instructions, and manufacturer's warranty requirements. Comply with Division 1.

.2 Conduct pre-installation testing as required by flooring manufacturer for substrate to receive rubber flooring.

1.4 DELIVERY, STORAGE, AND HANDLING:

1.4.1 Materials shall not be delivered or installed until all masonry, painting, plastering, and tile work are completed, and all overhead mechanical work, and lighting have been installed.

1.4.2 Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and directions for storage and mixing with other components.

1.4.3 Store materials to comply with manufacturer's directions to prevent deterioration from moisture, heat, cold, direct sunlight, or other causes.

1.5 WARRANTY:

1.6.2 Manufacturer's Warranty: Manufacturer to warrant flooring to be free from manufacturing defects for a period of five (5) years from Date of Substantial Completion. Submit for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.

PART 2 – PRODUCTS – Basis of Design

2.1 MATERIALS:

2.1.1 Flooring and adhesives as manufactured by Ecore International. Color to be selected by Architect from manufacturer's standard colors.

.1 Flooring: ECOfit Rolls with Itstru-5 technology.

.2 Adhesive: E-Grip III a single-component, zero-VOC, urethane adhesive.

PART 3 – EXECUTION

3.1 EXAMINATION AND PREPARATION:

3.1.1 Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other Sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.1.2 Surface Preparation: Comply with manufacturer's technical manual for installation details and requirements.

3.2 INSTALLATION:

3.2.1 Fusion Bonded Rubber Flooring Installation: Comply with manufacturer's technical manual for installation procedures and techniques.

3.3 FIELD QUALITY REQUIREMENTS:

3.3.1 Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service, consisting of product use recommendations and periodic site visit for inspection of product installation, in accordance with manufacturer's instructions.

.1 Site Visits: Manufacturer to recommend the number and duration of periodic site visits, and Architect will determine based on manufacturer's recommendations.

3.4 CLEANING AND PROTECTION:

3.4.1 Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris. Clean flooring just before final inspection. Use materials and procedures recommended by flooring manufacturer.

3.4.2 Protection: Protect installed product and finish surfaces from damage during construction operation.

3.4.3 Safety: No smoking, open flames or sparks from electrical equipment or any other source shall be permitted during the installation process, or in areas where materials are stored.

END OF SECTION

PAINTS AND COATINGS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Furnishing of materials and equipment and completion of painting and painter's finish on exposed interior and exterior surfaces as required to complete the painting and finishing as indicated and specified.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 SUBMITTALS:

1.2.1 Samples: Prepare samples of colors and textures based upon the Architect's selections and submit them for review.

.1 Painted Wall Samples: Prepare on 8" by 10" matt board in a stair step manner so all required coats show.

.2 Painted Wood Samples: Prepare on clear Douglas fir or pine 1" by 4" by 24" long strips, arranged in a stair step manner so all required coats show.

1.2.2 Submittal procedures and quantities are specified in Division 1.

1.3 QUALITY ASSURANCE:

1.3.1 The intent and requirements of this section, is that materials, items and surfaces which are normally painted and finished in construction of this type and quality, shall be so included, whether or not said materials, items or surfaces are specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.

1.3.2 The following general categories of construction and items are included under other sections, and shall not be a part of this section:

.1 Shop prime painting of structural and miscellaneous iron or steel.

.2 Shop finished construction and items.

1.3.3 Paint exposed mechanical, plumbing and electrical construction, which is not factory finished.

1.3.4 The Room Finish Schedules indicated, show the location of interior room surfaces to be painted or finished. The schedule indications are general and do not necessarily define the detail requirements. Include detailed refinements and further instructions as may be given for the required complete finishing of spaces and rooms.

1.3.5 Regulatory Requirements. The quantity of volatile organic compounds (VOC) used in paint products shall not exceed the limits permitted under the current regulations for architectural coatings of the San Diego County Air Pollution Control District.

1.4 DELIVERY, STORAGE AND HANDLING:

1.4.1 Delivery:

.1 Deliver paint in manufacturer's labeled and sealed containers. Labels shall include manufacturer's name, brand, type, batch number, color of paint and instructions for reducing. Thin only in accordance with printed directions of manufacturer. Thinning shall comply with the regulations of the air pollution control district having jurisdiction.

.2 Do not deliver or use materials other than those specified, or approved.

1.4.2 Storage and Handling: Store paint materials and equipment, when not in actual use, in places specifically assigned for that purpose. Ventilate storage space and provide fire protection. Mix and handle paint in these assigned areas; use metal containers for mixing and handling and designed for safety. Remove paint materials, including rags, tarpaulins, mixers, empty containers and filled or partially filled containers from the building areas at the close of each working day.

1.5 PROJECT CONDITIONS:

1.5.1 Environmental Requirements: In enclosed spaces, perform the application and drying of paint only when the temperature is 65 degrees F or above and maintained constantly to prevent condensation.

1.5.2 Examine the drawings and the specifications of other trades and consult with the other trades to determine the full extent of surfaces and items which are specified to include shop priming and shop finish painting.

1.6 WARRANTY:

In addition to the warranty and correction of work requirements of the General Conditions, warrant painting and finishing against peeling, fading, cracking, blistering, or crazing for a period of 2 years from the date of "Notice of Completion". The written warranty shall include materials and labor. The warranty shall be signed by the paint manufacturer, the painter and the Contractor and shall be submitted in accordance with Division 1.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Substitutions: Materials will be considered for substitution subject to requirements specified in Division 1. Submit chemical formulations of materials proposed for substitution to demonstrate that formulation of substitution is similar to formulation of specified product; or results of test showing that performance of substitution is equivalent to performance of specified product.

2.1.2 Primer and sealer coats may be thinned no more than 10 percent, with paint manufacturer's thinner. Use other materials as they come from the can, except as otherwise approved.

2.1.3 Secure the Color Schedule before undercoating. Unless otherwise specified, tint undercoats slightly to approximate the color of the finish coat. Obtain approval of colors before proceeding with the finishing operations.

2.1.4 Where a specific name is not given for a product or ingredient, provide item of the best quality of the approved manufacturer, which is normally used for the intended purpose.

2.2 COLOR SELECTION:

2.2.1 The Architect has selected the finish colors and will determine the basic hues of all surfaces to be painted or finished.

2.2.2 After the actual painting and finishing has started, the Architect retains the right to make minor modifications in tone and shade on the various surfaces to suit the actual lighting conditions encountered. Submit additional samples, as required, to assist the Architect in his final selection.

2.2.3 The number of colors to be used in any given room or space, and on the entire project, will be determined by the Architect.

2.3 PAINTING SCHEDULE:

2.3.1 Refer to Finish Schedule on the Drawings.

2.3.2 Miscellaneous: Construction visible through screen vents and grilles shall have one heavy coat of flat black paint.

PART 3 - EXECUTION

3.1 EXAMINATION:

Examine surfaces to be painted before beginning painting operations. Construction of other trades that has been left or installed in a condition not suitable to receive paint, stain, other specified finish shall be repaired or corrected by the applicable trade before painting. Painting of defective or unsuitable surface implies acceptance of the surface.

3.2 PREPARATION:

3.2.1 Protection:

.1 Before painting remove hardware, accessories, plates, lighting fixtures and similar items or provide protection of such items. On completion of each space, replace above items. Use only skilled mechanics for removing and connecting above items. Protect adjacent surfaces as required or directed.

.2 Wherever painting and finishing is being performed, protect floors, surfaces and items from damage by the painting operations. Provide clean drop cloths wherever necessary. Orderly and carefully arrange and protect supplies, materials, paints, and containers.

3.2.2 Surface Preparation:

.1 General: Surfaces shall be clean and dry before painting and finishing. Remove dirt and dust by stiff bristle brush and wiping with cloths. Remove oil and grease by cleaning using a materials and methods recommended by the paint manufacturer. Thoroughly rinse surfaces with

water which have been contaminated with chemicals. Apply the first coat of paint as soon as possible after cleaning and drying the surfaces.

.2 Shop Primed Ferrous Metal Surfaces: Wash free of grease, dirt, oil, and dust, using materials and methods recommended by the paint manufacturer. Repair shop primed surfaces and touch up wherever shop priming is damaged, and at all welds.

.3 Galvanized Metal Surfaces: Pretreat surfaces by cleaning with a vinyl wash coat or wash and etch with a phosphoric acid etching compound, as recommended by the paint manufacturer. If phosphoric acid etching is used, rinse with water and allow to dry. If vinyl wash coat is used, apply primer the same day as vinyl wash coat is applied.

.4 Concrete Surfaces: Thoroughly clean from oil and other deposits from form surfaces and remove laitance and powder. Do not start painting operations until surfaces are clean and sound and thoroughly cured and dried.

.5 Wood Surfaces: Sand smooth and clean before application of the first coat. Putty and spackle smooth, holes, splits and scratches after first coat application.

.6 Gypsum Board, Hardboard, Other Similar Materials: Dust down with brush or with fine sandpaper.

3.2.3 Preparation of Existing Surfaces:

.1 Metals: Remove all chalk, dirt and mildew thoroughly. If it is difficult to thoroughly remove all chalk, dirt and mildew by washing thoroughly and rinsing, apply one coat of exterior oil-based primer when the surface is completely dry. This will aid in obtaining proper adhesion properties. Make certain to make the paint application as soon as possible after cleaning to prevent possible mildew spore growth from returning.

.2 Aluminum: Dull all glossy areas with sandpaper. Remove any loose dirt, paint or other material prior to painting, using a scraper or power brush if necessary. Wipe clean and dry thoroughly. Prime with a zinc chromate primer or acrylic primer prior to finish coating.

.3 Galvanized Steel: Wash all previously painted galvanized surfaces with a quality paint thinner to remove grease and deposits. If the galvanized surface is broken and rust is evident, remove the rust to bare metal by wire brushing, sanding or blasting. Clean thoroughly and spot prime the bare metal with acrylic primer.

.4 Interior Wood: Remove all loose, peeling, flaking, or scaling paint by scraping, chipping or sanding. Feather back all rough paint completely and prepare surface by sanding. In exterior cases, remove old paint completely and prepare surface and primer as new wood. Spot prime bare areas as though they were new wood. Seal all knot holes and surface stains with shellac before using recommended primer. To remove the gloss from old painted surfaces, sand with proper grade sand paper, use a wire brush, or use a liquid deglossing compound. A general cleaning solution can also be used. This is especially important on areas protected from direct weathering, such as under the eaves. Wipe clean or flush thoroughly with clean water to remove any visible contaminants before repainting. Let dry thoroughly before repainting. Where bare spots exist, prime interior wood with a stain blocking primer or oil based primer. Exterior bare spots, prime with exterior primer.

.5 Drywall: Latex topcoat materials may be used as a primer (usually some thinning is desired), but if semi-gloss or gloss paints are to be used as the topcoats, the primer should be tested for "enamel hold-out". If this is poor, a regular latex primer-sealer, such as a quick drying interior latex primer-sealer should be used.

.6 Fill holes and cracks in gypsum board surfaces with a spackling compound. Voids around doors, windows, fixtures, or other permanent items shall be caulked with sealant compound specified in Section 07 90 00. Spot prime patched and repaired areas with a primer-sealer as recommended by the paint manufacturer for the surfaces to be refinished.

.7 Fill holes and blemished wood surfaces with wood patching compound and spot prime.

3.3 APPLICATION:

3.3.1 Application: Apply paints by brush or roller except as otherwise specified. Use paint of proper consistency for each coat, well brushed out or flowed on to obtain a uniform finish free from holidays, brush marks, sags, crawls, or other defects.

3.3.2 Materials shall be applied in accordance with the approved manufacturer's directions and specifications. Accomplish thinning required in the manner and with the type of reducer recommended by manufacturer.

3.3.3 The proper number of coats of paints and other finishes specified, properly applied, will result in the desired effect. Should this effect not be attained, apply additional coats of the specified materials and methods.

3.3.4 Each coat of paint shall vary in shade from the proceeding coat in a manner that will make each coat readily distinguishable without affecting the finish color.

3.3.5 Sand enamel and varnish coats smooth before recoating. Repair defects and unevenness in previously applied coatings before applying the next coat.

3.3.6 Paint and finish surfaces indicated in the Room Finish Schedule and as specified herein. Where questions occur as to the indicated surfaces inform the Architect and receive clarification therefrom.

3.3.7 Millwork: Prime or back-paint (other than shop painted or prefinished surfaces) within 24 hours after delivery to Project site. Apply 2 coats paint (primer and filler or undercoat) on top and bottom edges of doors after being cut and fit but preferably before being hung. Prime or seal edges and cut surfaces of boarding or paneling.

3.4 CLEANING, TOUCH-UP AND REFINISHING:

3.4.1 Touch-Up and Refinishing: Touch up, refinish, or repaint runs, sags, misses, holidays, stains and other defects in the painted surfaces, including inadequate coverage and mil thickness as necessary to produce a first-class workmanlike job.

3.4.2 Cleaning:

.1 Immediately remove accidental spatter and spillage and restore the damaged surfaces to perfect condition. Completely remove paint spots and spatter on glass, porcelain fixtures, other surfaces and clean the surfaces.

.2 At the completion of finishing operations in each space or room, remove materials, supplies, debris and rubbish from the areas and leave in a clean, orderly condition.

END OF SECTION

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VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Porcelain enamel markerboards, aluminum trim and accessories.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

Aluminum Association (AA)
American Society for Testing and Materials (ASTM)
American National Standards Institute (ANSI)
U.S. General Services Administration (Fed. Spec.)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit shop drawings of each type of markerboard required. Include sections of typical trim members, dimensions, elevations, details, anchoring and other installation details.

1.3.2 Product Data: Furnish 2 typewritten or printed copies of care and cleaning instructions to the Owner.

1.3.3 Samples: Submit full range of color samples for each type of markerboard, trim and accessory required. Provide 12 inch square samples of sheet materials and 12 inch lengths of trim members for color verification after selections have been made.

1.3.4 Submittal procedures and quantities are specified in Division 1.

1.4 DELIVERY, STORAGE, AND HANDLING:

Wrap or otherwise package markerboard and components for protection against damage during shipment and storage. Store components in a clean, dry storage area as packaged by the manufacturer, with manufacturer's seals and labels intact. Store porcelain enameled steel markerboard panels on edge in a manner to prevent bowing, warping or other irregularities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

Provide markerboards 3'-0" by 4'-0" in size, unless otherwise noted. Subject to compliance with requirements, acceptable manufacturers or equal:

Claridge Products Equipment Co.

Greensteel, Inc.
A-1 Educational Equipment Co.
Nelson-Adams Co.

2.2 MARKERBOARDS:

2.2.1 Porcelain-On-Metal: Balanced, high pressure laminated, 3 ply construction; consisting of face sheet, core and backing.

2.2.2 Face Sheet: Enameling grade steel sheet coated on exposed face with 3 coat process of primer, ground coat and color cover coat, and on concealed face with 2 coat process of primer and ground coat. Fuse cover and ground coats to steel at firing temperatures standard with manufacturer, but not less than 1200 degrees F (649 degrees C).

.1 Proprietary Facing Sheet: At Contractor's option, "Vitracite" or "LCS" porcelain enamel clad, Type 1 stretcher-leveled aluminized steel face sheet, by Claridge Products and Equipment, Inc. may be provided in lieu of facing sheet construction specified above. Fuse porcelain enamel coating to steel at approximately 1000 degrees F (538 degrees C).

.2 Facing Sheet Thickness: 24 gage.

.3 Cover Coat Finish: Manufacturer's light-colored special writing surface with gloss finish intended for use with manufacturer recommended fast drying liquid felt-tipped markers.

2.2.3 Core: Particle board complying with ANSI A208.1-1989, Grade 1-M-1, 3/8 inch thick.

2.2.4 Backing Sheet: Aluminum sheet, 0.015 inch thick.

2.2.5 Laminating Adhesive: Manufacturer's standard moisture resistant thermoplastic type.

2.3 ALUMINUM TRIM AND ACCESSORIES:

2.3.1 Fabricate frames and trim of not less than 0.062 inch thick, 6063-T5 alloy aluminum extrusions. Provide trim in straight single lengths wherever possible, keep joints to a minimum. Miter corners to a neat, hairline closure.

.1 Finish: Clear anodized finish meeting the requirements of AA designation M12C22A31.

2.3.2 Field Applied Trim: Manufacturer's standard slip-on trim.

2.3.3 Chalktray: Manufacturer's standard ribbed section, solid extrusion with exposed ends smoothly curved. Provide chalktray under all markerboards.

2.4 FABRICATION:

2.4.1 Assembly: Provide either factory-assembled or field-assembled markerboard units.

2.4.2 Make joints only where total length exceeds maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the board, as acceptable to the Architect.

2.4.3 Splice rails shall be manufacturer's standard "H" sections designed to receive and lap board on both edges along vertical butt joints. Exposed face of splice rail shall be colored to match adjacent board. No butt joints will be permitted in boards less than 16 feet in length.

2.4.4 Provide manufacturer's standard mullion trim at joints between markerboards.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 Factory-Assembled Units: Deliver factory-assembled markerboard units completely assembled in one piece without joints, wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the project site. Use splines at joints to maintain surface alignment.

3.1.2 Field Assembled Units: Install plumb and level directly to wall surface, with full aluminum surround trim, chalk tray, fastenings and all related accessories. Check for surface movement under hand pressure and reinstall board if movement occurs. No markerboard joints will be allowed unless the board is over 12 feet long.

3.1.3 Install units in accordance with manufacturer's instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

3.1.4 Aluminum Trim: Provide neat, tightly closed, bend-around mitered corners, spliced only if over 16 foot lengths, with no single piece less than 4 feet in length. Fasten to walls with concealed fasteners as recommended by the manufacturer.

END OF SECTION

IDENTIFICATION DEVICES

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Interior and exterior signs and directories.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

The Aluminum Association (AA)
American Society for Testing and Materials (ASTM)
American National Standards Institute (ANSI)
Architectural Aluminum Manufacturers Association (AAMA)
National Fire Protection Association (NFPA)
U.S. General Services Administration (Fed. Spec.)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Submit complete shop drawings, catalog cuts, and erection and installation details, as appropriate, for all identification devices. Indicate dimensions, construction details, reinforcement, anchorage, and installation with relation to the building construction.

1.3.2 Samples: Submit samples of all materials, finishes and coatings before fabrication. Samples shall also include all hardware and attachments required for mounting and/or assembly. All finishes and coatings shall show color and shall be submitted on the materials to which they are to be applied.

1.3.3 Submittal procedures and quantities are specified in Division 1.

1.4 REGULATORY REQUIREMENTS:

1.4.1 Requirements for Physically Disabled: Provide identifying devices meeting the requirements for the physically disabled of the California Code of Regulations (CCR) Title 24 Part 2; Section 1117B.5.1 and as follows:

.1 ADA Accessibility Guidelines for Buildings and Facilities, dated June 26, 1991 as amended April 5, 1993 and January 18, 1994, and July 2004.

.2 Design: Section 1117B.5.1.1 and Figure 11B-6.

.3 Color of Symbol: Section 1117B.5.1.2.

.4 Braille Symbols: Section 1117B.5.2. Contracted Grade 2 Braille shall be used as specifically required in other portions of these standards. Dots shall be 1/10 inch on centers in each cell with 2/10 inch space between cells. Dots shall be raised a minimum of 1/40 inch above the background.

- .5 Portions of Letters and Numbers: Section 1117B.5.3.
 - .6 Character Height: Section 1117B.5.4.
 - .7 Contrast and Finish of Symbols: Section 1117B.5.5.
 - .8 Raised Characters and Pictorial Symbol Signs: Section 1117B.6.6.3.
 - a. Letter Type: Section 1117B.6.6.1.
 - b. Symbol Size: Section 1117B.6.6.2.
 - c. Pictorial Symbol Signs: (Pictograms non-geometric) Section 1117B.6.6.3.
 - .9 Information Posted: Section 1117B.5.8.
 - .10 Mounting Location and Height (where permanent identification is provided or where signage is required for rooms and spaces): 1117B.5.9.
 - .11 Doorways Leading to Men's and Women's Sanitary Facilities: Provide signs that comply with the applicable requirements of Sections 1115B.5, 1115B.5.2 and 1117B.5.9.
- 1.4.2 Requirements for Fire and Building Safety: Signage per NFPA 704 "Standard System for the Hazards of Materials for Emergency Response". This standard shall address the health, flammability, instability, and related hazards that are presented by short term, acute exposure to a material under conditions of fire, spill, or similar emergencies.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Aluminum Alloy Products:

- .1 Sheet or Plate, ASTM B 209, alloy selected to meet the structural requirements of the specific application. Surface finish shall be smooth, free of extrusion marks or imperfections.
- .2 Extrusions: ASTM B 221, alloy 6063-T5, or other alloy of equivalent durability and strength properties. Extrusions shall have a wall thickness of not less than 0.125 inch except 0.093 inch when reinforcing bosses are provided.
- .3 Aluminum Castings: Alloy and temper recommended by aluminum producer or finisher for casting process used and for use and finish indicated.
- .4 Aluminum for sign faces with routed thru copy shall be minimum 0.063 thick, Alloy 5005 H 34.

2.1.2 Steel: Structural metals for concealed framing shall be of hot or rolled steel as required to satisfy structural requirements.

- .1 Steel Pipe: ASTM A 53, Grade B.
- .2 Steel Shapes: ASTM A 36.
- .3 Steel Tubing: ASTM A 501.

2.1.3 Plastic Laminate: FS L-P-387, Type NDP, 1/8 inch thick.

2.1.4 Foam Tape: Black, pressure sensitive adhesive both sides. Acceptable product or equal (no known equal):

3M; #4408 Series

2.1.5 Adhesives: Type recommended by the manufacturer of the material specified to be laminated or adhered. No adhesives that will fade, discolor or delaminate as a result of proximity to sunlight or heat therefrom shall be used. Adhesives shall not change the color or otherwise deteriorate the materials to which they are to be applied. The adhesives shall be of non-staining, non-yellowing quality.

2.2 METAL LETTERS AND NUMBERS:

2.2.1 Form letters and numbers by casting of aluminum. Produce characters with smooth, flat faces; sharp corners; precisely formed lines and profiles; and free from pits, scale, sand holes or other defects. Cast lugs into backs of characters and tap to receive threaded mounting studs.

2.2.2 Finish: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations.

.1 Baked Enamel Finish: AA-M4C12C42 Flx (manufacturer's standard nondirectional mechanical finish including sanding and filing; cleaning with inhibited chemicals; conversion coated with an acid chromate fluoride phosphate treatment; and painted with organic coating specified herein.)

.2 Organic Coating: Manufacturer's standard thermosetting enamel system consisting of prime coat and finish coat.

2.3 PLASTIC SIGNS FOR DISABLED:

2.3.1 Materials: Matte finish plastic laminate plaques in sizes indicated. Provide 3/8 inch radius corners.

2.3.2 Graphics Application: Use engraving or graphic blasting through the face layer to expose the second layer to depress the background a minimum of 3/32 inch below the borders, graphic symbols, text, and braille.

2.3.3 Messages:

.1 Title 24 Signage: Provide restrooms with 12 inch diameter circular shaped signs with international graphic symbol for women and equilateral triangular shaped signs with 12 inch sides and the international graphic symbol for men.

.2 ADA Signage: Provide restrooms with square signs with the word "WOMEN" or "MEN" in both text and braille. Text shall have 1-1/2 inch high Helvetica medium type face.

.3 Entrance Signs: All building entrances that are accessible to and usable by physically disabled persons shall be identified with at least one standard sign and with additional directional signs, as required, to be visible to persons along approaching pedestrian ways.

2.3.4 Mounting: Provide countersunk mounting holes in plaques and sufficient mounting screws. Sign to be 6" by 6" mounted on aluminum/glass doors.

2.4 PRESSURE SENSITIVE LETTERS:

Provide precision cut vinyl letters. Ensure that all edges and corners of finished letterforms and graphics are true and clean. Do not use letterforms and graphics with rounded positive or negative corners, nicked, cut, or ragged edges.

PART 3 - EXECUTION

3.1 EXAMINATION:

3.1.1 Examine substrates to receive adhesively applied identification devices before start of work to ensure that they are free of grease, oil, paint, wax, dust, dirt, or other foreign matter that might inhibit bonding to the substrate.

3.1.2 Do not start work until deficiencies have been corrected. Start of work of this section constitutes acceptance of the surfaces.

3.2 INSTALLATION:

3.2.1 Interior Signs: Install signs at locations shown on drawings. Ensure that signs are installed plumb and true, at mounting heights indicated, and by method specified. Do not install signs on doors or other surfaces until finishes on such surfaces have been applied.

3.2.2 Interior and Exterior Signs: Install signs at locations indicated. Ensure that signs are installed plumb and true, at mounting heights indicated, and by method specified. Do not install signs on doors or other surfaces until finishes on such surfaces have been applied.

3.2.3 Anchorage: Provide anchorage where necessary for fastening signs securely in place. Anchorage not otherwise specified or indicated shall include expansion shields and powder-driven fasteners, when approved, for concrete and masonry; toggle or molly bolts to stud flanges or steel backing plates in light gage metal framed partitions; full threaded wood screws to wood doors and machine screws to metal doors.

3.3 ADJUST AND CLEAN:

Repair any damage to signs incurred during installation. Replace signs which cannot be repaired to new condition. Clean glass, frames, and other sign surfaces, adjust hardware for proper operation.

END OF SECTION

SECTION 10 5113 - METAL LOCKERS

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. Welded athletic lockers.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.4 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 each type of metal locker
- B. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.
- C. Samples: For each color specified, in manufacturer's standard size.
- D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.
- E. Samples for Verification: For the following products, in manufacturer's standard size:
 - 1. Lockers and equipment.
 - 2. Locker benches.
- F. Product Schedule: For lockers. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.
- B. Deliver to Owner by registered mail or overnight package service

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate sizes and locations of concrete bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Warranty Period for Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.
 - 1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 and 2016 California Building Code, including the Americans with Disability Act.

2.3 WELDED ATHLETIC LOCKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. List Industries Inc.
- B. Perforated Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges
 - 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
- C. Expanded-Metal Doors: Fabricated from 0.090-inch nominal-thickness expanded metal; welded to 0.105-inch nominal-thickness steel angle frame; with 0.090-inch nominal-thickness, steel sheet lock panel backed by 0.060-inch nominal-thickness, steel sheet retainer welded to door frame.
- D. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 - 1. Tops and Bottoms: 0.060-inch nominal thickness, with single bend at edges.
 - 2. Backs: 0.048-inch nominal thickness.
 - 3. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
- E. Unperforated Sides: Fabricated from **0.060-inch** nominal-thickness steel sheet.
- F. Perforated Sides: Fabricated from 0.060-inch nominal-thickness steel sheet with manufacturer's standard diamond perforations.

- G. Expanded-Metal Sides: Fabricated from 0.090-inch nominal-thickness expanded metal; welded to 0.105-inch nominal-thickness steel angles or 0.060-inch nominal-thickness steel channel frames.
- H. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet or 0.097-inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
- I. Reinforced Bottoms: Structural channels, formed from 0.060-inch nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- J. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees
 - 1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- K. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
 - 1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
 - a. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- L. Projecting Turn-Handle and Latch: Steel handle welded to manufacturer's standard, three-point, cremone-type latching mechanism consisting of steel rods or bars that engage locker frame at top and bottom of door, and center latch that engages strike jamb; with steel padlock loop.
- M. Door Handle and Latch for Box Lockers: Stainless-steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
- N. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- O. Coat Rods: Manufacturer's standard.
- P. Coat Rods: 1-inch-diameter steel nickel plated.
- Q. Continuous Zee Base: 4 inches high; fabricated from 0.075-inch nominal-thickness steel sheet.
- R. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 - 1. Closures: Vertical end type.
- S. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
- T. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- U. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.

- V. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- W. Materials:
 - 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.
- X. Finish: Baked enamel or powder coat.
 - 1. Color: As selected by Architect from manufacturer's full range

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top of lockers and to floor.
- B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.
2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
3. Attach sloping-top units to metal lockers, with closures at exposed ends.
4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

3.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 5113

FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Fire extinguishers, fire extinguisher cabinets, and mounting brackets.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 SUBMITTALS:

1.2.1 Product Data: Submit manufacturer's catalog data of extinguishers and extinguisher cabinets. For fire extinguisher cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction and materials.

1.2.2 Submittal procedures and quantities are specified in Division 1.

1.3 REGULATORY REQUIREMENTS:

Fire extinguishers shall be labeled by Underwriters' Laboratories, Inc (UL) for the specified ratings and classifications, as acceptable to the State Fire Marshal.

1.4 DELIVERY, STORAGE, AND HANDLING:

1.4.1 Deliver extinguishers and cabinets to the site in unopened containers, labeled plainly with the manufacturer's names and brands. Deliver cabinets and extinguisher to the site ready for installation.

1.4.2 Store cabinets and extinguisher in safe, dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS:

2.1.1 Multi-Purpose Dry Chemical Type: UL rated 4A-60B:C in nominal 10 pound capacity. Acceptable products or equal:

Larsen's Manufacturing Co.; Model No. MP10
JL Industries; Cosmic 10E
Potter-Roemer Div.; No. 3010

2.2 FIRE EXTINGUISHER CABINETS:

2.2.1 General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated or specified.

2.2.2 Construction: Provide cabinets of recessed type designed for wall types identified in architectural sheet A1.5 Acceptable products or equal:

Larsen's Manufacturing Co.; Architectural Series
JL Industries; Ambassador Series
Potter-Roemer Div.; 7000 Alta Series

.1 Box: Fabricate box of not lighter than 22 gage cold rolled steel with manufacturers standard prime coat.

.2 Trim: Fabricate trim of not lighter than 20 gage cold rolled steel with manufacturers standard prime coat.

.3 Doors: Tubular construction not less than 1/2 inch thick from not lighter than 20 gage cold rolled steel with manufacturers standard prime coat. Provide doors full glazed style with 1/8 inch thick, clear float glass. Furnish doors with full length steel piano hinge with stainless steel pin, satin finish aluminum pull handle and self adjusting roller catch.

2.3 MOUNTING BRACKETS:

Provide brackets designed to prevent accidental dislodgement of extinguisher, of sizes required for type and capacity of extinguisher specified, plated finish.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 Mount items specified herein in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of State Fire Marshal. Coordinate the cabinet manufacturer's mounting details with other trades as their work progresses.

3.1.2 Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

3.1.3 Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions. Use oval head fasteners with exposed surfaces of same finish as cabinet. Fasten cabinets to metal studs or framing with sheet metal screws and to wood studs with full threaded wood screws or with sheet metal screws. Attach surface mounted cabinets to concrete or masonry with expansion anchors and machine screws.

END OF SECTION

SECTION 10 7516 - GROUND-SET FLAGPOLES

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 ground-set flagpoles made from aluminum.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Shop Drawings: For flagpoles.
 - 1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
 - 2. Include section, and details of foundation system.
- C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to the California Building Code (CBC).
- B. Structural Performance: Flagpole assemblies, including anchorages and supports, shall be in compliance with the CBC, and shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is Design Speed 85 MPH Risk Category B
 - 2. Base flagpole design on nylon or cotton flags of maximum standard size suitable for use with flagpole size indicated.

2.3 ALUMINUM FLAGPOLES

- A. Aluminum Flagpoles: Cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Flagpole.
 - b. Concord Industries, Inc.
 - c. U.S. Flag & Flagpole Supply, LP.
 - d. Or Equal.
- B. Exposed Height: 35 Feet
- C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
 - 1. Fabricate shop and field joints without using fasteners, screw collars, or lead caulking.
 - 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
- D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch wall thickness with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.
 - 1. Flashing Collar: Same material and finish as flagpole.

- E. Sleeve for Aluminum Flagpole: Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.

- 1. Flashing Collar: Same material and finish as flagpole.

2.4 FITTINGS

- A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

- 1. 20-oz. copper with 23-karat, gold-leaf finish.

- B. External Halyard: Ball-bearing, non-fouling, revolving truck assembly of cast metal with continuous 5/16-inch-diameter, braided polypropylene halyard and 9-inch cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

- 1. Halyards and Cleats: One halyard and one cleat at each flagpole.
 - 2. Cleat Covers: Cast metal, finished to match flagpole, secured with cylinder locks.
 - 3. Halyard Covers: 2-inch channel, 60 inches long, finished to match flagpole.
 - 4. Halyard Flag Snaps: Chromium-plated bronze. Furnish two per halyard.

- a. Provide with neoprene or vinyl covers.

- 5. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Furnish two per halyard.

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Acme/Lingo Flagpoles, LLC.
 - 2) American Flagpole and Flag Co.
 - 3) Flagpole Toppers - Gettysburg Flag Works.
 - 4) Or Equal.

2.5 MISCELLANEOUS MATERIALS

- A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

- B. Sand: ASTM C 33/C 33M, fine aggregate.

- C. Elastomeric Joint Sealant Single-component neutral-curing silicone joint sealant complying with requirements in Section 07 92 00 "Joint Sealants."

- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.6 ALUMINUM FINISHES

- A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.
- E. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.
- F. Place concrete, as specified in Section 03 30 00 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
- G. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.
- B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 10 7516

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY:

1.1.1 Section Includes: Toilet room accessories.

1.1.2 Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES:

The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 4220 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM)
General Services Administration Federal Specifications (Fed. Spec.)

1.3 SUBMITTALS:

1.3.1 Shop Drawings: Provide complete information, diagrams, templates, and installation instructions as required for the installation of all items specified herein, and in sufficient time so that all backing, blocking, framing, and formwork can be properly installed, and so that the work of other trades will not be delayed.

1.3.2 Product Data: Submit manufacturer's literature and brochures, and catalog cuts, showing complete details of all manufactured and fabricated items, including materials, dimensions, gages, profiles, method of mounting, and finishes.

1.3.3 Samples: Submit for each accessory item to verify design, operation, and finish requirements. Approved full-size samples will be returned and may be used in the Work.

1.3.4 Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1.3.5 Submittal procedures and quantities are specified in Division 1.

1.4 REGULATORY REQUIREMENTS:

Provide toilet accessories meeting the requirements for the physically disabled of the California Building Code (CBC), and ADA Accessibility Guidelines for Buildings and Facilities, dated June 26, 1991 as amended April 5, 1993 and January 18, 1994, and July 2004.

1.5 DELIVERY, STORAGE, AND HANDLING:

Deliver toilet accessories to the site in unopened containers labeled with the manufacturer's name and model numbers as they occur on the submittals. Store accessories in their containers in a dry location.

1.6 GUARANTEE:

In addition to the guarantee requirements of the General Condition, guarantee mirrors against silver spoilage for a period of 10 years from the date of "Notice to Proceed".

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), minimum nominal thickness of 0.0312 inch unless otherwise specified.

2.1.2 Sheet Steel: ASTM A 366, cold rolled, commercial quality, 0.0359 inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

2.1.3 Galvanized Steel Sheet: ASTM A 653, G60.

2.1.4 Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electro-deposited on base metal.

2.1.5 Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

2.1.6 Mirror Glass: Mirror quality plate or float glass in accordance with ASTM C 1036 with silver coating, copper protective coating and nonmetallic paint coating complying with Fed. Spec. DD-M-411B.

2.1.7 Fasteners: Stainless steel except fully concealed fasteners may be galvanized steel.

2.2 FABRICATION:

2.2.1 Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

2.2.2 Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

2.2.3 Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

.1 Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

2.2.4 Mirror-Unit Hangers: Provide one of the following mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

.1 One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

.2 Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

2.2.5 Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 6 keys to Owner as specified in Division 1.

2.3 TOILET ACCESSORY SCHEDULE:

2.3.1 Towel Dispenser/Waste Receptacle-Recessed: Units capable of dispensing 600 C-fold or 800 multi-fold paper towels without adjustment or adapters. Equip unit with a removable, stainless steel waste receptacle with a capacity of not less than 12 gallons. Hem top and bottom edges of waste receptacles for safe handling. Acceptable products or equal:

American Specialties, Inc.; No. 0469
Bobrick Washroom Equipment Company; No. B-3944
Bradley Corp.; No. 234

2.3.2 Multi-Roll Toilet Paper Dispenser-Surface Mounted: Units capable of dispensing 2 standard toilet tissue rolls as well as 5 inch diameter, 5000 sheet toilet tissue rolls; designed to permit spare roll to drop into place after bottom roll is used up. Provide cabinet fronts with 0.0500 inch stainless steel door frames and tumbler locks. Acceptable products or equal:

American Specialties, Inc.; No. 0030
Bobrick Washroom Equipment Company; No. B-2888
Bradley Corp.; No. 5402

2.3.3 Toilet Seat Cover Dispenser-Surface Mounted: Units with a capacity for 250 seat covers and concealed opening for filling. Acceptable products or equal:

American Specialties, Inc.; No. 0477SM
Bobrick Washroom Equipment Company; No. B-221
Bradley Corp.; No. 5831

2.3.4 Grab Bars: Stainless steel tubing 1-1/2 inch diameter by 18 gage wall thickness, swagged and heliarc welded to minimum 11 gage flanges. Lock flanges to concealed 13 gage stainless steel mounting plate with 3 stainless steel set screws. Furnish bars with manufacturer's standard mounting anchor plates for stud walls. Acceptable products or equal:

American Specialties, Inc.; 3200 Series
Bobrick Washroom Equipment Company; B-6806 Series
Bradley Corp.; 812 Series

2.3.5 Mirrors: Provide mirrors consisting of stainless steel frame; 1/4 inch float glass mirror; and 26 gage galvanized steel back with integral horizontal concealed hanging brackets. Protect mirror by high impact plastic filler strips at edges and shock absorbing, waterproof, non-abrasive polystyrene foam padding at back. Provide frame of one piece, 3/4" by 3/4" stainless steel angle, not lighter than 0.0500 inch. Miter corners of frames and heliarc weld, with welds ground and polished smooth. Acceptable products or equal:

American Specialties, Inc.; 0600 Series
Bobrick Washroom Equipment Company; B-290 Series
Bradley Corp.; 700 Series

2.3.6 Robe Hook: Single robe hook constructed entirely of stainless steel, with integral flange designed for mounting over a 0.0625 inch stainless steel mounting plate with stainless steel set screws. Acceptable products or equal:

American Specialties, Inc.; No. 7340
Bobrick Washroom Equipment Company; No. B-6717
Bradley Corp.; No. 9115

2.3.7 Soap Dish-Recessed: Heavy duty unit constructed entirely of not lighter than 0.0375 stainless steel, soap dish and flange drawn one piece seamless construction. Acceptable products or equal:

American Specialties, Inc.; No. 0407
Bobrick Washroom Equipment Company; No. B-438
Bradley Corp.; No. 9401

2.3.8 Folding Shower Seat: Fabricate seat consisting of a frame of 1-1/4" by 0.0625" square and 1" by 0.0500" round stainless tubing and a seat of six 5/16" by 3" phenolic slats. Provide left or right hand units as indicated or required. Acceptable products or equal:

American Specialties, Inc.; No. 8211R or 8211L
Bobrick Washroom Equipment Company; No. B-5171 or B-5181
Bradley Corp.; No. 9568 or 9567

2.3.9 Shower Curtain Rods: Fabricate curtain rods of 0.0500 inch stainless steel, not less than 1-1/4 inch outside diameter. Provide rods of size to suit openings indicated, with flanges of one piece 0.0312 inch stainless steel, die formed. Acceptable products or equal:

American Specialties, Inc.; No. 1206A
Bobrick Washroom Equipment Company; No. B-6047
Bradley Corp.; No. 9531

2.3.10 Shower Curtain: Fabricate curtain from 0.008 inch thick white vinyl material with all edges hemmed. Provide top edge with nickel plated bronze grommets spaced not more than 6 inches on center, and provide one stainless steel spring wire curtain hook for each grommet. Acceptable products or equal:

American Specialties, Inc.; No. 1200 and 1200SH
Bobrick Washroom Equipment Company; No. B-204-1 and B-204-2
Bradley Corp.; No. 9533 and 9536

2.3.11 Mop and Broom Holder with Shelf: Fabricate units consisting of an 8 inch wide shelf and 15 inch high wall flange of one piece construction with welded gussets. Furnish unit 34 inches long with 3 mop and broom holders and 4 hooks mounted on the wall flange. Fabricate the wall flange, shelf and gussets of 18 gage stainless steel. Mop holders spring loaded rubber cam type designed to accommodate handles from 7/8 inch to 1-1/4 inches in diameter. Fabricate hooks of 16 gage stainless steel welded to the wall flange. Acceptable products or equal:

American Specialties, Inc.; No. 1308
Bobrick Washroom Equipment Company; No. B-239
Bradley Corp.; No. 9933

2.3.12 Soap Dispensers-Surface Mounted: Vertical type container body of stainless steel, drawn, one piece seamless construction. Provide container with a capacity of 40 fluid ounces and an unbreakable refill indicator and hinged filler top with tumbler lock. Fabricate back of 0.0312 inch stainless steel with 0.0375 inch stainless steel mounting bracket, and 0.0375 inch

stainless steel wall plate. Provide all purpose type valves as specified herein. Acceptable products or equal:

American Specialties, Inc.; No. 0343
Bobrick Washroom Equipment Company; No. B-112
Bradley Corp.; No. 6562

.1 All Purpose Valves: Fabricate of ABS plastic with Buna N O-ring seals, suitable for use with synthetic detergents, hand lotions and liquid soaps.

2.3.13 Underlavatory Insulating Piping Coverings: Comply with testing standard of ASTM E 84. White, antimicrobial, molded-vinyl or closed-cell PVC covering for supply and drain piping assemblies intended for use at accessible lavatories to prevent direct contact with and burns from piping. Provide components as required for applications indicated with flip tops at valves that allow service access without removing coverings. Acceptable products or equal:

Brocar Products, Inc.; Trap Wrap
Truebro, Inc.; Lav-Shield
Plumberex, Inc.; Handy-Shield Safety Covers

2.3.14 Towel Bar: Surface-mounted 24" length towel bar, 3/4 inch diameter, stainless steel with satin finish. Acceptable product or equal:

American Specialties, Inc.
Bobrick Washroom Equipment Company; No. B-6747
Bradley Corporation

PART 3 - EXECUTION

3.1 EXAMINATION:

3.1.1 Before covering wall framing with gypsum board, examine framing to ensure that backing plates and grab bar mounting kits have been installed behind surface mounted accessories in such positions as to receive all attachment screws.

3.1.2 Verify that pipes, vents, conduits and other construction features do not protrude into rough wall opening space required for recessed accessories.

3.1.3 Do not proceed with the work until unsatisfactory conditions have been resolved.

3.2 INSTALLATION:

3.2.1 Install grab bars using manufacturer's recommended mounting kits.

3.2.2 Install accessories in accordance with the manufacturer's printed instructions except install surface mounted accessories other than grab bars with molly or toggle bolts to metal studs or backing plates attached directly to studs.

3.2.3 Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square.

3.3 ADJUSTING AND CLEANING:

3.3.1 Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

3.3.2 Clean and polish all exposed surfaces in strict accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION

Section 12 2116
Vertical Louver Blinds

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vertical louver blinds at all sliding doors and all windows other than in bathrooms.

1.2 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 12 2113 - Horizontal Louver Blinds.

1.3 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Corded Window Covering Products; Current Edition, Including All Revisions.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2015.

1.4 SUBMITTALS

- A. See Section 01 3300 - Submittals, for submittal procedures.
- 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. Certification: Provide certification that product complies with WCMA A100.1.
- D. Shop Drawings: Indicate headrail location and schematic wire diagram of electronic controls and motors.
- E. Selection Samples: For vanes, color chips or material samples representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For vanes, minimum size 6 inches square, representing actual materials, color and perforations.
- G. Operation and Maintenance Data: Manufacturer's data on repair and replacement of vanes, chains, and other parts.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Vanes: 20 of each type and size.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum 3 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. If blinds are delivered early and stored at the project, deliver in unopened containers; handle and store in such a manner to protect them from damage.

PART 2 PRODUCTS

21 MANUFACTURERS

- A. Vertical Louver Blinds:
 - 1. Hunter Douglas; Model Vertical Solutions: www.hunterdouglas.com.
 - 2. Levolor Contract; Model Stock Vertical: www.levolorcontract.com.
 - 3. Graber, division of Springs Window Fashions; Model Vinyl Vertical Blinds: www.graberblinds.com.
 - 4. The same manufacturer as for horizontal blinds, to obtain match.

22 BLINDS AND BLIND COMPONENTS

- A. Vertical Louver Blinds: Horizontal travel, vertical vane louver units complete with tracks, pivot and traversing mechanisms, and accessories, as follows:
 - 1. Vanes: PVC vanes of the size indicated.
 - 2. Operation: Manual.
 - 3. Direction of Travel: mirroring opening at sliding glass doors and windows.
 - 4. Mounting: Inside (between jambs).
 - 5. Cord and Chain Operation: Comply with WCMA A100.1.
- B. Tracks: Channel tracks as required for type of operation, extruded aluminum with clear anodized finish, with end caps.
 - 1. Dimensions: Manufacturer's standard, selected for suitability for installation conditions, span, and weight of vanes.
 - 2. Vane Rotation: Chain driven direct rotation by activating tilt gear within end cap assembly in turn actuating tilt rod and worm-and-spur gears in carrier trucks.
 - 3. Operating Components: Internally mounted heavy-duty extruded aluminum tilt rod, vane carriers, and other components required for proper performance and designed for smooth, quiet, trouble free operation.
 - 4. Pivot Mechanism: Geared for synchronous 180 degrees rotation of vanes and type of operation indicated.
 - 5. Vane Carriers: Metal carriers with ball-bearing wheels or thermoplastic trucks, equipped with linkages or other devices to ensure positive spacing of vanes.
 - 6. Tilt Chain: Nickel plated brass beaded ball chain, minimum 1/8 inch diameter; locate at drawback side of units as indicated.
- C. Fabric Vanes: Integrally colored, extruded PVC vanes with fabric infill; flat, 2 inches (50mm) wide.
 - 1. Fabric: Manufacturer's standard flame resistant fabric.
 - 2. Flammability: Comply with NFPA 701.
 - 3. PVC Color: As selected by Architect from manufacturer's full range of colors.
 - 4. PVC Texture: Smooth.
 - 5. Fabric Color and Texture: Match fabric color specified for horizontal blinds, subject to approval of Architect.
- D. Brackets and Mounting Hardware: As recommended by manufacturer for the mounting configuration and span indicated; provide manufacturer's standard L- bracket with clip for outside mounting and clip only for inside mounting.
- E. Valances: To match vane design and color.
 - 1. Style: As selected by Architect from blind manufacturer's full selection.

23 FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Fabricate blinds to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom of vanes and finish floor.
 - 2. Horizontal Dimensions - Outside Mounting: Cover window frames, trim, and casings completely.
- C. Dimensional Tolerances: Fabricate blinds to within plus/minus 1/8 inch of intended dimensions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not start installation before openings are finished and all finishes have been completed; do not install until painting is completed.
- B. Field measure finished openings prior to ordering or fabrication.

3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Coordinate the work with window installation and placement of concealed blocking to support blinds.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions using mounting style as indicated.
- B. Installation Tolerances:
 - 1. Maximum Offset From Level: 1/16 inch.
- C. Adjust blinds for smooth operation.
- D. Replace blinds that exceed specified dimensional tolerances at no extra cost to Owner.

3.4 CLEANING

- A. Clean installed work to like-new condition.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

End of Section

SECTION 12 3616 - METAL COUNTERTOPS

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. Stainless-steel countertops.
 - 2. Stainless-steel wall-mounted shelves.
 - 3. Stainless-steel sinks.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded wall-mounted shelves.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For metal fabrications.
 - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 - 2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.
 - 3. For wall-mounted shelves, indicate requirements for blocking or reinforcements in supporting construction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products only after casework and supports on which they will be installed has been completed in installation areas.
- B. Keep finished surfaces of products covered with polyethylene film or other protective covering during handling and installation.

1.6 FIELD CONDITIONS

- A. Field Measurements: Where products are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Established Dimensions: Where products are indicated to fit to other construction, establish dimensions for areas where products are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL FABRICATIONS

- A. Countertops: Fabricate from 0.062-inch-thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch over the base cabinets.
 - 1. Joints: Fabricate countertops without field-made joints
 - 2. Weld shop-made joints.
 - 3. Sound deaden the undersurface with heavy-build mastic coating.
 - 4. Extend the top down to provide a 1-inch-thick edge with a 1/2-inch return flange.
 - 5. Form the backsplash coved to and integral with top surface, with a 1/2-inch-thick top edge and 1/2-inch return flange.
 - 6. Provide raised (marine) edge around perimeter of tops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.
- B. Wall-Mounted Shelves: Fabricate from stainless-steel sheet, not less than 0.050-inch nominal thickness. Weld shop-made joints. Fold front edge down a minimum of 3/4 inch; fold back edge up a minimum of 3 inches. Provide integral stiffening brackets, formed by folding up ends a minimum of 3/4 inch and by welding to upturned edges.

2.2 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304

2.3 STAINLESS-STEEL FINISH

- A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
- C. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- E. Seal junctures of countertops, splashes, and walls with sealant for countertops.
- F. Wall-Mounted Shelves: Fasten to supporting construction through upturned back edge at not less than 24 inches o.c.
 - 1. For framed construction, fasten through wall or partition finishes directly to framing, blocking, or reinforcements.

3.3 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces. Remove and replace damaged products or touch up and refinish damaged areas to match original factory finish, as approved by Architect.
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 3616

SECTION 12 3623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

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 plastic-laminate-clad countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: For plastic-laminate-clad countertops.
 - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 - 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
- C. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.
- D. Samples for Initial Selection: For plastic laminates.
- E. Samples for Verification: As follows:
 - 1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
 - 2. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. High-pressure decorative laminate.
 - 3. Adhesives.

- B. Quality Standard Compliance Certificates: AWI Quality Certification Program
- C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.

2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

B. Grade: Premium

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from manufacturer's full range in the following categories:

E. Edge Treatment: Same as laminate cladding on horizontal surfaces

F. Core Material: Exterior-grade plywood

G. Core Material at Sinks: exterior-grade plywood

H. Core Thickness: 3/4 inch

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

J. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

1. Softwood Plywood: DOC PS 1.

2.3 ACCESSORIES

A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Outside Diameter: 3 inch
2. Color: Black

2.4 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:

1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.

- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten

according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 - 2. Secure backsplashes to walls with adhesive
 - 3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semi-exposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 3623.13

SECTION 12 3661.16 - SOLID SURFACING COUNTERTOPS

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. Solid surface material countertops.
 - 2. Solid surface material backsplashes.
 - 3. Solid surface material end splashes.
 - 4. Solid surface material apron fronts.
 - 5. Solid surface material sinks.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements **after** base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Per Architectural Finish Plan A9.6.
 - 2. Colors and Patterns: As selected by Architect from manufacturer's full range.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Premium
- B. Configuration:

1. Front: Straight, slightly eased at top
 2. Backsplash: Straight, slightly eased at corner
 3. End Splash: Matching backsplash
- C. Countertops: 3/4-inch-thick, solid surface material with front edge built up with same material.
- D. Backsplashes: 3/4-inch-thick, solid surface material
- E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
1. Fabricate with loose backsplashes for field assembly.
 2. Install integral sink bowls in countertops in the shop.
- F. Joints: Fabricate countertops without joints.
- G. Joints: Fabricate countertops in sections for joining in field
1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
 2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- H. Cutouts and Holes:
1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.
 4. Counter-Mounted Cooktops: Prepare countertops in shop for field cutting openings for cooktops. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 9200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Pre-drill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

- I. Apply sealant to gaps at walls; comply with Section 07 9200 "Joint Sealants."

END OF SECTION 12 3661.16

SECTION 21 1313 - WET-PIPE SPRINKLER SYSTEMS

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. Pipes, fittings, and specialties.
 - 2. Cover system for sprinkler piping.
 - 3. Specialty valves.
 - 4. Sprinklers.
 - 5. Alarm devices.
 - 6. Manual control stations.
 - 7. Control panels.
 - 8. Pressure gages.

1.3 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: For wet-pipe sprinkler systems.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Welding certificates.
- C. Field Test Reports:
 - 1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
 - 2. Fire-hydrant flow test report.

- D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and 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. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and 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 used on Project.

1.7 QUALIFICATIONS

- A. Contractor Qualifications: The Contractor shall be a California-licensed in possession of a valid fire sprinkler Contractor's license (for wet pipe). The Contractor shall have a minimum of three years' experience in the installation of these types of systems.
- B. Installer Qualifications: Overall supervision of work shall be NICET certified.
 - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems.
- C. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

1.8 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of sprinkler service.
 - 2. Do not proceed with interruption of sprinkler service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 ABOVEGROUND PIPING AND COMPONENTS

- A. Pipe Sizes 2.5 inches (65 mm) and Larger:
 1. Piping shall be ASTM A-53/A-135/A-795, Weight Class STD (Standard), Schedule 40 (except for Schedule 30 for pipe sizes 8 inches (200 mm) and greater in diameter), Type E or Type S, Grade A; black steel pipe. Steel pipe shall be joined by means of flanges welded or screwed to the pipe, threaded fittings, or grooved couplings only. Piping shall not be joined by welding or weld fittings.
 2. Thinwall Pipe: Schedule 10 Pipe meeting ASTM A-53, A-135 or A-795 requirements with grooved pipe couplings and fittings. Grooves in Schedule 10 pipe shall be rolled groove only. Pipe having wall thicknesses less than Schedule 10 are unacceptable.
- B. Pipe Sizes 2 inch (50 mm) and Smaller:
 1. Steel Pipe: Steel piping shall be ASTM A-53/A-135/A-795, Weight Class STD (Standard), Schedule 40, Type E or Type S, Grade A, steel pipe with threaded end connections. Fittings shall be ASME B16.39, Class 150, cast or ductile iron threaded fittings. Unions shall be ASME B16.39, Class 150, unions. Pipe may also be joined using grooved couplings and fittings. Where grooved joining is used, cut or rolled grooves are acceptable.

2.3 SPECIALTY VALVES

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating:
 1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
- C. Body Material: Cast or ductile iron.
- D. Size: Same as connected piping.
- E. End Connections: Flanged or grooved.
- F. Alarm Valves:
 1. Standard: UL 193.
 2. Design: For horizontal or vertical installation.
 3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, and fill-line attachment with strainer.
 4. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

5. 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.

2.4 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1. Standard: UL 199.
2. Pressure Rating: 175 psig.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Standard: UL 1474.
2. Pressure Rating: 250-psig minimum.
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

2.5 SPRINKLERS

- A. Listed in UL's "Fire Protection Equipment Directory"
- B. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- C. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Nonresidential Applications: UL 199.
 - 2. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6 (minimum), and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- D. Sprinkler Finishes: As indicated on approved plans.
- E. Special Coatings: Wax and corrosion-resistant paint. As indicated on approved plans.
- F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
- G. Sprinkler Guards:
 - 1. Standard: UL 199.
 - 2. Type: Wire cage with fastening device for attaching to sprinkler.

2.6 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Electrically Operated Alarm Bell:
 - 1. Standard: UL 464.
 - 2. Type: Vibrating, metal alarm bell.
 - 3. Size: 6-inch minimum.
 - 4. Finish: Red-enamel factory finish, suitable for outdoor use.
 - 5. 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.
- C. Water-Flow Indicators:
 - 1. Standard: UL 346.
 - 2. Water-Flow Detector: Electrically supervised.
 - 3. Components: 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.
 - 4. Type: Paddle operated.
 - 5. Pressure Rating: 250 psig.
 - 6. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. 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.

2.7 PRESSURE GAGES

- A. Standard: UL 393.
- B. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- C. Pressure Gage Range: 0- to 250-psig minimum.
- D. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291 to . Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building.
- B. Install shutoff valve, pressure gage, drain, and other accessories indicated at connection to water-service piping.

3.3 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 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.
 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- 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 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 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 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not 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.

3.4 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 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 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. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- 3.5 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING
- A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and NFPA 13 for supports.
- 3.6 VALVE AND SPECIALTIES INSTALLATION
- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 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. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 1. Install valves in vertical position for proper direction of flow, in main supply to system.
 2. Install alarm valves with bypass check valve.

3.7 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

3.8 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 1. Leak Test: After installation, charge systems 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. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 4. Energize circuits to electrical equipment and devices.
 5. Coordinate with fire-alarm tests. Operate as required.
 6. Coordinate with fire-pump tests. Operate as required.
 7. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.10 CLEANING

- A. Clean dirt and debris from sprinklers.

- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

END OF SECTION 21 1313

SECTION 22 0513 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. 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.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Rotor: Random-wound, squirrel cage.
- F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- G. Temperature Rise: Match insulation rating.
- H. Insulation: Class F.
- I. 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.
- J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

- A. Motors Used with Reduced-Voltage and Multispeed 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. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
 2. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 3. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
1. Permanent-split capacitor.
 2. Split phase.
 3. Capacitor start, inductor run.
 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.

- E. 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.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 22 0513

SECTION 22 0517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Sleeves.
 2. Sleeve-seal systems.
 3. Grout.
 4. Silicone sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advance Products & Systems, Inc.
 2. CALPICO, Inc.
 3. GPT; an EnPro Industries company.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop collar.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, with plain ends and integral welded waterstop collar.
- D. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- E. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advance Products & Systems, Inc.
 2. CALPICO, Inc.
 3. GPT; an EnPro Industries company.
 4. Metraflex Company (The).
- B. Description:
1. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 2. Designed to form a hydrostatic seal of 20 psig minimum.
 3. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 4. Pressure Plates: Carbon steel Stainless steel, Type 316.
 5. Connecting Bolts and Nuts: Stainless steel, Type 316 of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.4 SILICONE SEALANTS

- A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Polymeric Systems, Inc.
 - d. Schnee-Morehead, Inc., an ITW company.
- B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. May National Associates, Inc.; a subsidiary of Sika Corporation.

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 annular clear space between piping and concrete slabs and walls.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 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.
 2. Using grout or silicone sealant, 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 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.
- E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 07 8413 "Penetration Firestopping."

3.2 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.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
- B. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 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: Cast-iron pipe sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Steel pipe sleeves.
 - 5. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Steel pipe sleeves.

END OF SECTION 22 0517

SECTION 22 0518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.
- D. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.2 FLOOR PLATES

- A. Split 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 insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping and Relocated Existing Piping:

- a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
- b. Chrome-Plated Piping: One-piece steel with polished, chrome-plated finish.
- c. Insulated Piping: One-piece steel with polished, chrome-plated finish.
- d. Insulated Piping: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
- e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
- f. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
- g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with polished, chrome-plated finish.
- h. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.

2. Escutcheons for Existing Piping to Remain:

- a. Chrome-Plated Piping: Split-casting, stamped steel with concealed hinge with polished, chrome-plated finish.
- b. Insulated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish
- c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
- d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge 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 and Relocated Existing Piping: Split floor plate.
- 2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 22 0518

SECTION 22 0519 - METERS AND GAGES FOR PLUMBING PIPING

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. Bimetallic-actuated thermometers.
 - 2. Liquid-in-glass thermometers.
 - 3. Thermowells.
 - 4. Dial-type pressure gages.
 - 5. Gage attachments.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of meter and gage.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ashcroft Inc.
 - 2. WATTS.
- B. Standard: ASME B40.200.

- C. Case: Liquid-filled and sealed type(s); stainless steel with 3-inch nominal diameter.
- D. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F.
- E. Connector Type(s): Union joint, rigid, back, with unified-inch screw threads.
- F. Connector Size: 1/2 inch, with ASME B1.1 screw threads.
- G. Stem: 0.25 or 0.375 inch in diameter; stainless steel.
- H. Window: Plain glass.
- I. Ring: Stainless steel.
- J. Element: Bimetal coil.
- K. Pointer: Dark-colored metal.
- L. Accuracy: Plus or minus 1 percent of scale range.

2.2 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:

1. Standard: ASME B40.200.
2. Case: Cast aluminum; 6-inch nominal size.
3. Case Form: Back angle unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
6. Window: Glass or plastic.
7. Stem: Aluminum or brass and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
8. Connector: 3/4 inch, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

B. Plastic-Case, Compact-Style, Liquid-in-Glass Thermometers:

1. Standard: ASME B40.200.
2. Case: Plastic; 6-inch nominal size.
3. Case Form: Back angle unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue organic liquid.
5. Tube Background: Nonreflective with permanently etched scale markings graduated in deg F.
6. Window: Glass or plastic.
7. Stem: Aluminum or brass and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.

8. Connector: 3/4 inch, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

C. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Flo Fab Inc.
 - b. Miljoco Corporation.
 - c. Weiss Instruments, Inc.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 7-inch nominal size unless otherwise indicated.
4. Case Form: Back angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass.
8. Stem: Aluminum and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

D. Plastic-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Miljoco Corporation.
 - b. Weiss Instruments, Inc.
2. Standard: ASME B40.200.
3. Case: Plastic; 7-inch nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass.
8. Stem: Aluminum, brass, or stainless steel and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.4 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ashcroft Inc.
 - b. Miljoco Corporation.
 - c. Weiss Instruments, Inc.
2. Standard: ASME B40.100.
3. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

B. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ashcroft Inc.
 - b. Weiss Instruments, Inc.
2. Standard: ASME B40.100.

3. Case: Sealed type; plastic; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.5 GAGE ATTACHMENTS

- A. Snubbers: ASME B40.100, brass; with NPS 1/4, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.
- B. Valves: Brass or stainless-steel needle, with NPS 1/4, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install thermowells with socket extending a minimum of 2 inches into fluid and in vertical position in piping tees.
- B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Install thermowells with extension on insulated piping.
- D. Fill thermowells with heat-transfer medium.
- E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.
- G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
- H. Install remote-mounted pressure gages on panel.
- I. Install valve and snubber in piping for each pressure gage for fluids.
- J. Install thermometers in the following locations:
 1. Inlet and outlet of each water heater.
 2. Inlets and outlets of each domestic water heat exchanger.
 3. Inlet and outlet of each domestic hot-water storage tank.
 4. Inlet and outlet of each remote domestic water chiller.

- K. Install pressure gages in the following locations:
 - 1. Building water service entrance into building.
 - 2. Inlet and outlet of each pressure-reducing valve.
 - 3. Suction and discharge of each domestic water pump.
- L. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.
- M. Adjust faces of meters and gages to proper angle for best visibility.

3.2 THERMOMETER SCHEDULE

- A. Thermometers at inlet and outlet of each domestic water heater shall be the following:
 - 1. Liquid-filled Sealed, bimetallic-actuated type.
 - 2. Metal case, industrial-style, liquid-in-glass type.
- B. Thermometer stems shall be of length to match thermowell insertion length.

3.3 THERMOMETER SCALE-RANGE SCHEDULE

- A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.
- B. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F.

3.4 PRESSURE-GAGE SCHEDULE

- A. Pressure gages at discharge of each water service into building shall be the following:
 - 1. Liquid-filled Sealed, direct-mounted, metal case.
 - 2. Sealed, direct-mounted, plastic case.
- B. Pressure gages at inlet and outlet of each water pressure-reducing valve shall be one of the following:
 - 1. Liquid-filled Sealed, direct-mounted, metal case.
 - 2. Sealed, direct-mounted, plastic case.
 - 3. Test plug with EPDM self-sealing rubber inserts.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

- A. Scale Range for Domestic Water Piping: 0 to 100 psi.
- B. Scale Range for Domestic Water Piping: 0 to 160 psi.

END OF SECTION 22 0519

SECTION 22 0523.12 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Brass ball valves.
 - 2. Bronze ball valves.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of valve.
 - 1. Certification that products comply with NSF 61 Annex G and NSF 372.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B1.20.1 for threads for threaded end valves.
 - 2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 3. ASME B16.18 for solder-joint connections.
 - 4. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 4 and larger.

2. Handlever: For quarter-turn valves smaller than NPS 4. H. Valves

in Insulated Piping:

1. Include 2-inch stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRASS BALL VALVES

A. Brass Ball Valves, One-Piece:

- a. [KITZ Corporation](#)
- b. [Standard: MSS SP-110.](#)
- c. CWP Rating: 400 psig.
- d. Body Design: One piece.
- e. Body Material: Forged brass or bronze.
- f. Ends: Threaded and soldered.
- g. Seats: PTFE.
- h. Stem: Brass or stainless steel.
- i. Ball: Chrome-plated brass or stainless steel.
- j. Port: Reduced.

B. Brass Ball Valves, Two-Piece with Full Port and Brass Trim:

1. [Manufacturers:](#) Subject to compliance with requirements, provide products by the following:
 - a. [Apollo Flow Controls; Conbraco Industries, Inc.](#)
2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Forged brass.
 - e. Ends: Threaded and soldered.
 - f. Seats: PTFE.
 - g. Stem: Brass.
 - h. Ball: Chrome-plated brass.
 - i. Port: Full.

C. Brass Ball Valves, Two-Piece with Regular Port and Brass Trim:

1. [Manufacturers:](#) Subject to compliance with requirements, provide products by the following:
 - a. [Apollo Flow Controls; Conbraco Industries, Inc.](#)

2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Forged brass.
 - e. Ends: Threaded and soldered.
 - f. Seats: PTFE.
 - g. Stem: Brass.
 - h. Ball: Chrome-plated brass.
 - i. Port: Regular.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, One-Piece:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 400 psig.
 - c. Body Design: One piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded.
 - f. Seats: PTFE.
 - g. Stem: Bronze.
 - h. Ball: Chrome-plated brass.
 - i. Port: Reduced.

B. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded and soldered.
 - f. Seats: PTFE.
 - g. Stem: Bronze or brass.

- h. Ball: Chrome-plated brass.
- i. Port: Full.

C. Bronze Ball Valves, Two-Piece with Regular Port and Bronze or Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
2. Description:
 - a. Standard: MSS SP-110.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded.
 - f. Seats: PTFE.
 - g. Stem: Bronze or brass.
 - h. Ball: Chrome-plated brass.
 - i. Port: Regular.

PART 3 - EXECUTION

3.1 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.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- B. Select valves with the following end connections:
 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve end option is indicated in valve schedules below.
 2. For Steel Piping, NPS 2 and Smaller: Threaded ends.

3.3 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG OR LESS)

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Brass ball valves, one piece.
3. Bronze ball valve, one piece with bronze trim.
4. Brass ball valves, two-piece with full port and brass trim.
5. Bronze ball valves, two-piece with full port and bronze or brass trim.

3.4 HIGH-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 TO 200 PSIG)

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Brass ball valve, one piece.
3. Bronze ball valve with bronze trim, one piece.
4. Brass ball valves, two-piece with full port and brass trim.
5. Bronze ball valves, two-piece with full port and bronze or brass trim.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. **Brass** ball valve, one piece.
3. Bronze ball valve, one piece with bronze trim.
4. Brass ball valves, two-piece with full port and brass trim.
5. Bronze ball valves, two-piece with full port and bronze or brass trim.

END OF SECTION 22 0523.12

SECTION 22 0523.14 - CHECK VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Bronze swing check valves.
 2. Iron swing check valves.
 3. Iron swing check valves with closure control.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of valve.
1. Certification that products comply with NSF 61 Annex G.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
1. ASME B1.20.1 for threads for threaded end valves.
 2. ASME B16.1 for flanges on iron valves.
 3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 4. ASME B16.18 for solder joint.
 5. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE SWING CHECK VALVES

A. Bronze Swing Check Valves with Bronze Disc, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Red White Valve Corp.
 - f. Stockham; Crane Energy Flow Solutions.
 - g. WATTS.
2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded or soldered. See valve schedule articles.
 - f. Disc: Bronze.

B. Bronze Swing Check Valves with Nonmetallic Disc, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Red White Valve Corp.
 - f. Stockham; Crane Energy Flow Solutions.
 - g. WATTS.
2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded or soldered. See valve schedule articles.
 - f. Disc: PTFE.

2.3 IRON SWING CHECK VALVES

A. Iron Swing Check Valves with Metal Seats, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Apollo Flow Controls; Conbraco Industries, Inc.
- b. Crane; Crane Energy Flow Solutions.
- c. Milwaukee Valve Company.
- d. NIBCO INC.
- e. Red White Valve Corp.
- f. Stockham; Crane Energy Flow Solutions.
- g. Sure Flow Equipment Inc.

2. Description:

- a. Standard: MSS SP-71, Type I.
- b. CWP Rating: 200 psig.
- c. Body Design: Clear or full waterway.
- d. Body Material: ASTM A 126, gray iron with bolted bonnet.
- e. Ends: Flanged or threaded. See valve schedule articles.
- f. Trim: Bronze.
- g. Gasket: Asbestos free.

B. Iron Swing Check Valves with Nonmetallic-to-Metal Seats, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Crane; Crane Energy Flow Solutions.
- b. Stockham; Crane Energy Flow Solutions.

2. Description:

- a. Standard: MSS SP-71, Type I.
- b. CWP Rating: 200 psig.
- c. Body Design: Clear or full waterway.
- d. Body Material: ASTM A 126, gray iron with bolted bonnet.
- e. Ends: Flanged or threaded. See valve schedule articles.
- f. Trim: Composition.
- g. Seat Ring: Bronze.
- h. Disc Holder: Bronze.
- i. Disc: PTFE.
- j. Gasket: Asbestos free.

2.4 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Iron Swing Check Valves with Lever- and Spring-Closure Control, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Crane; Crane Energy Flow Solutions.
- b. Hammond Valve.
- c. Milwaukee Valve Company.
- d. NIBCO INC.
- e. Stockham; Crane Energy Flow Solutions.
- f. WATTS.

2. Description:
 - a. Standard: MSS SP-71, Type I.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Clear or full waterway.
 - d. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - e. Ends: Flanged or threaded. See valve schedule articles.
 - f. Trim: Bronze.
 - g. Gasket: Asbestos free.
 - h. Closure Control: Factory-installed exterior lever and spring.

B. Iron Swing Check Valves with Lever and Weight-Closure Control, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Stockham; Crane Energy Flow Solutions.
 - f. WATTS.
2. Description:
 - a. Standard: MSS SP-71, Type I.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Clear or full waterway.
 - d. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - e. Ends: Flanged or threaded. See valve schedule articles.
 - f. Trim: Bronze.
 - g. Gasket: Asbestos free.
 - h. Closure Control: Factory-installed exterior lever and weight.

PART 3 - EXECUTION

3.1 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 swing check valves for proper direction of flow in horizontal position with hinge pin level.

3.2 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.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
 - b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or spring; metal-seat check valves.
 - c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
- B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- C. End Connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded or soldered.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged or threaded.
 - 3. For Copper Tubing, NPS 5 and Larger: Flanged.
 - 4. For Steel Piping, NPS 2 and Smaller: Threaded.
 - 5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged or threaded.
 - 6. For Steel Piping, NPS 5 and Larger: Flanged.

3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller: Bronze swing check valves bronze disc, Class 125, with soldered end connections.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Iron swing check valves with metal seats, Class 125, with threaded or flanged end connections.
 - 2. Iron swing check valves with closure control, lever and spring, Class 125, with threaded or flanged end connections.

END OF SECTION 22 0523.14

SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal hanger-shield inserts.
4. Fastener systems.
5. Pipe-positioning systems.
6. Equipment supports.

B. Related Requirements:

1. Section 05 5000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 22 0516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
3. Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details and include calculations.

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.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Pipe Welding Qualifications: Qualify procedures and operators according to "2015 ASME Boiler and Pressure Vessel Code, Section IX."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.
- 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.

2.2 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, hot-dip galvanized, or electro-galvanized.
 - 3. Nonmetallic Coatings: Plastic coated or epoxy powder coated.
 - 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.
- C. Copper Pipe and Tube Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-58, 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.

2.4 THERMAL HANGER-SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 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: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - c. MKT Fastening, LLC.
 - d. Simpson Strong-Tie Co., Inc.
- B. Mechanical-Expansion Anchors: Insert-wedge-type anchors, 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: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. B-line, an Eaton business.
 - b. Empire Tool and Manufacturing Co., Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - e. MKT Fastening, LLC.
 - 2. Indoor Applications: stainless steel.
 - 3. Outdoor Applications: Stainless steel.

2.6 PIPE-POSITIONING SYSTEMS

- A. Description: IAPMO PS 42 positioning system composed 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 MATERIALS

- A. Aluminum: ASTM B 221.
- B. Carbon Steel: ASTM A 1011/A 1011M.
- C. Structural Steel: ASTM A 36/A 36M carbon-steel plates, shapes, and bars; black and galvanized.
- D. Stainless Steel: ASTM A 240/A 240M.
- E. Grout: ASTM C 1107/C 1107M, 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 APPLICATION

- A. Comply with requirements in Section 07 8413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. 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. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

- D. 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.
- E. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- 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 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 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 or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 6. Thermal Hanger Shields: Install with insulation of 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 bearing surface smooth.
- 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.
- 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.

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. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those 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.

- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-58 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 finishes.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal hanger-shield inserts for insulated piping and tubing.
- J. 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 up to 1050 deg F pipes NPS 4 to NPS 24, 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 36, 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 8.
 - 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.

11. Extension Hinged or Two-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 or carbon-steel plate.
 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 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 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 two rods if longitudinal movement caused by expansion and contraction occurs.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction occurs.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction occurs but vertical adjustment is unnecessary.
 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 occurs and vertical adjustment is unnecessary.
 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, in addition to expansion and contraction, is required.
- K. 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.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- L. 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 of 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.
- M. 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.

N. 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.

O. 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 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.
- P. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- Q. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- R. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 22 0529

SECTION 22 0548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Open-spring isolators.
5. Housed-spring isolators.
6. Restrained-spring isolators.
7. Housed-restrained-spring isolators.
8. Pipe-riser resilient supports.
9. Resilient pipe guides.
10. Elastomeric hangers.
11. Spring hangers.
12. Snubbers.
13. Restraint channel bracings.
14. Restraint cables.
15. Seismic-restraint accessories.
16. Mechanical anchor bolts.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.

1. Include design calculations and details for selecting vibration isolators and seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Welding certificates.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval 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 unavailable, 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 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC.
 - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC.
 - a. Component Importance Factor: 1.0.
 - b. Component Response Modification Factor: 1.5.
 - c. Component Amplification Factor: 1.0.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): .
 - 4. Design Spectral Response Acceleration at 1.0-Second Period: .

2.2 ELASTOMERIC ISOLATION PADS

- A. Elastomeric Isolation Pads: .
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
 - 2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
 - 3. Size: Factory or field cut to match requirements of supported equipment.
 - 4. Pad Material: Oil and water resistant with elastomeric properties.
 - 5. Surface Pattern: Smooth pattern.

6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.

2.3 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
2. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
2. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.5 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.

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 rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.6 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
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 rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top housing with attachment and leveling bolt.

2.7 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
 - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top plate with threaded mounting holes.
 - c. Internal leveling bolt that acts as blocking during installation.

3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.8 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.9 PIPE-RISER RESILIENT SUPPORT

A. Description: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum 1/2-inch-thick neoprene.

1. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
2. Maximum Load Per Support: 500 psig on isolation material providing equal isolation in all directions.

2.10 RESILIENT PIPE GUIDES

A. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum 1/2-inch-thick neoprene.

1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.11 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods: .

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.12 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Mason Industries, Inc.
2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.13 SNUBBERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Mason Industries, Inc.

B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch-thick resilient cushion.

2.14 RESTRAINT CHANNEL BRACINGS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Mason Industries, Inc.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.15 RESTRAINT CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Mason Industries, Inc.

B. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.16 SEISMIC-RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Mason Industries, Inc.

B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

- F. 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.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- 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 is adequate to carry present and future static and seismic loads within specified loading limits.

3.2 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork.
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Comply with requirements in Section 07 7200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- D. 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 inch.
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- E. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127.
 - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 3. Brace a change of direction longer than 12 feet.
- F. Install cables so they do not bend across edges of adjacent equipment or building structure.

- G. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- H. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- I. 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.
- J. 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.
- K. 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.

3.3 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 22 1116 "Domestic Water Piping" for piping flexible connections.

3.4 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.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.5 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.

END OF SECTION 22 0548

SECTION 22 0553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
 2. Warning signs and labels.
 3. Pipe labels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Brimar Industries, Inc.
 - c. Carlton Industries, LP.
 2. Material and Thickness: Brass, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 3. Letter Color: White.
 4. Background Color: Black Blue Red Yellow.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 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-quarters the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Brady Corporation.
 - b. Brimar Industries, Inc.
 - c. Carlton Industries, LP.
2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
 3. Letter Color: White.
 4. Background Color: Black Blue Red Yellow.
 5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 7. Minimum Letter Size: 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-quarters the size of principal lettering.
 8. Fasteners: Stainless-steel rivets or self-tapping screws.
 9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Brady Corporation.
 2. Brimar Industries, Inc.
 3. Carlton Industries, LP.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: White.
- D. Background Color: Black Blue Red Yellow.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 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-quarters the size of principal lettering.

- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Carlton Industries, LP.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include 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 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

PART 3 - EXECUTION

3.1 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.2 PIPE LABEL INSTALLATION

- A. Pipe Label Locations: 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 and on both sides of 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 along each run. Reduce intervals to 25 feet 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: Safety green.
 - b. Letter Colors: White.
2. Sanitary Waste Piping:
 - a. Background Color: Safety black.
 - b. Letter Color: White.

END OF SECTION 22 0553

SECTION 22 0719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic hot-water piping.
 - 2. Domestic recirculating hot-water piping.
 - 3. Sanitary waste piping exposed to freezing conditions.
 - 4. Storm-water piping exposed to freezing conditions.
 - 5. Roof drains and rainwater leaders.
 - 6. Supplies and drains for handicap-accessible lavatories and sinks.
- B. Related Sections:
 - 1. Section 22 0716 "Plumbing Equipment Insulation."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. 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.
- B. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Supply and Drain Protective Shielding Guards: ICC A117.1.

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. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. Pittsburgh Corning Corporation.
 2. Special-Shaped Insulation: ASTM C 552, Type III.
 3. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 4. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
 5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Aeroflex USA, Inc.

- b. Armacell LLC.
- c. K-Flex USA.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Knauf Insulation.
 - c. Manson Insulation Inc.
 - d. Owens Corning.
2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Armacell LLC.
 - b. Nomaco Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Ramco Insulation, Inc.

2.3 ADHESIVES

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.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Foster Brand; H. B. Fuller Construction Products.
2. For indoor applications, adhesive shall have a VOC content of 50 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."

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Aeroflex USA, Inc.
 - b. Armacell LLC.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. K-Flex USA.

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.

E. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.

F. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Dow Corning Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. P.I.C. Plastics, Inc.
 - d. Speedline Corporation.

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products.
 - c. Knauf Insulation.
2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Knauf Insulation.
 - e. Mon-Eco Industries, Inc.
 - f. Vimasco Corporation.
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 SEALANTS

A. Joint Sealants for Cellular-Glass Products:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Pittsburgh Corning Corporation.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.

B. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

- a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: Aluminum.
- C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
- 1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.

2.6 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.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Foster Brand; H. B. Fuller Construction Products.
 - b. Vimasco Corporation.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Speedline Corporation.
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: White.
 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- C. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. ITW Insulation Systems; Illinois Tool Works, Inc.
 2. Sheet and roll stock ready for shop or field sizing.
 3. Finish and thickness are indicated in field-applied jacket schedules.
 4. Moisture Barrier for Indoor Applications: 2.5-mil-thick polysurlyn.
 5. Moisture Barrier for Outdoor Applications: 2.5-mil-thick polysurlyn.
 6. Factory-Fabricated Fitting Covers:
 - a. Same material, finish, and thickness as jacket.
 - b. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c. Tee covers.
 - d. Flange and union covers.
 - e. End caps.
 - f. Beveled collars.
 - g. Valve covers.
 - h. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- D. Underground Direct-Buried Jacket: 125-mil-thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.
1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. Pittsburgh Corning Corporation.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Knauf Insulation.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Knauf Insulation.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. Ideal Tape Co., Inc., an American Biltrite Company.
 2. Width: 2 inches.
 3. Thickness: 6 mils.
 4. Adhesion: 64 ounces force/inch in width.
 5. Elongation: 500 percent.
 6. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

- a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Knauf Insulation.
2. Width: 2 inches.
 3. Thickness: 3.7 mils.
 4. Adhesion: 100 ounces force/inch in width.
 5. Elongation: 5 percent.
 6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with closed seal.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. ITW Insulation Systems; Illinois Tool Works, Inc.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- C. Wire: 0.062-inch soft-annealed, stainless steel.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. C & F Wire.

2.11 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Truebro.
 - b. Zurn Industries, LLC.
 2. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
- B. Protective Shielding Piping Enclosures:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Truebro.
 - b. Zurn Industries, LLC.

2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 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 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. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. 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.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. 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 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.
- 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.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. 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.

3.3 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 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.
 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 07 8413 "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 07 8413 "Penetration Firestopping."

3.4 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 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.

3.5 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of 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 services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, 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 cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, 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. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- #### A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install 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 cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE 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 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, 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.

3.8 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install 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 cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.9 FIELD-APPLIED JACKET INSTALLATION

- A. 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 laps at longitudinal seams and 3-inch-wide joint strips at end joints.
 - 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- B. Where PVC jackets are indicated, install with 1-inch 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.
- C. Where metal jackets are indicated, install with 2-inch 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 o.c. and at end joints.

3.10 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "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.

3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. 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.

- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.12 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.

3.13 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Hot and Recirculated Hot Water: Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 3/4 inch thick.
 - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - 3. Polyolefin: 3/4 inch thick.
- B. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 3/4 inch thick.
 - 2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - 3. Polyolefin: 1 inch thick.
- C. Sanitary Waste Piping Where Heat Tracing Is Installed: Mineral-fiber, preformed pipe insulation, Type I, 1-1/2 inches thick.

3.14 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Domestic Water Piping: Insulation shall be one of the following:
 - 1. Cellular Glass: 2 inches thick.
 - 2. Flexible Elastomeric: 2 inches thick.
 - 3. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
 - 4. Polyolefin: 2 inches thick.

3.15 OUTDOOR, UNDERGROUND PIPING INSULATION SCHEDULE

- A. Sanitary Waste Piping, All Sizes, Where Heat Tracing Is Installed: Cellular glass, 2 inches thick.

3.16 INDOOR, 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, Concealed:
 - 1. None.
 - 2. PVC: 30 mils thick.
 - 3. Aluminum, Smooth: 0.024 inch thick.
- D. Piping, Exposed:
 - 1. None.
 - 2. PVC: 30 mils thick.
 - 3. Aluminum, Smooth: 0.024 inch thick.

3.17 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

- A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 22 0719

SECTION 22 1113 - FACILITY WATER DISTRIBUTION PIPING

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 water-distribution piping and related components outside the building for **fire-service mains**.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. LLDPE: Linear, low-density polyethylene plastic.
- C. PA: Polyamide (nylon) plastic.
- D. PE: Polyethylene plastic.
- E. PP: Polypropylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
- H. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
 - 1. Wiring Diagrams: Power, signal, and control wiring for alarms.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- 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 ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping
 - 2. Comply with NSF 61 Annex G for materials for water-service piping and specialties for domestic water.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.

3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping 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.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
1. Notify **Construction Manager** no fewer than **two** days in advance of proposed interruption of service.
 2. Do not proceed with interruption of water-distribution service without **Construction Manager's** permission.

1.10 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

- A. PVC, AWWA Pipe: AWWA C900, C900, DR-14, **Class 305**, with bell end with gasket, and with spigot end.
1. Comply with UL 1285 for fire-service mains if indicated.
 2. PVC Fabricated Fittings: AWWA C900, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

- a. Gaskets: AWWA C111, rubber.
5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
- a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.2 JOINING MATERIALS

- A. Refer to Section 33 0500 "Common Work Results for Utilities" for commonly used joining materials.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series.
- C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Nonrising-Stem, Metal-Seated Gate Valves:

- a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
 - 1) Standard: AWWA C500.
 - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.

2. Nonrising-Stem, Resilient-Seated Gate Valves:

- a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.

3. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:

- a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 250 psig (1725 kPa).

- 3) End Connections: Push on or mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
 - 4. OS&Y, Rising-Stem, Metal-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.
 - 1) Standard: AWWA C500.
 - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
 - 3) End Connections: Flanged.
 - 5. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig (1380 kPa).
 - 3) End Connections: Flanged.
- B. UL/FMG, Cast-Iron Gate Valves:
- 1. UL/FMG, Nonrising-Stem Gate Valves:
 - a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.
 - 1) Standards: UL 262 and FMG approved.
 - 2) Minimum Pressure Rating: 175 psig (1207 kPa).
 - 3) End Connections: Flanged.
 - 2. OS&Y, Rising-Stem Gate Valves:
 - a. Description: Iron body and bonnet and bronze seating material.
 - 1) Standards: UL 262 and FMG approved.
 - 2) Minimum Pressure Rating: 175 psig (1207 kPa).
 - 3) End Connections: Flanged.
 - b. pressure.
 - 3. Configuration: Designed for **horizontal, straight through** flow.
 - 4. Accessories:
 - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
- C. **Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies:**

1. Standards: SDW-105 and UL listed and City of San Diego approved.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: per manufacturer
4. Size: PER PLAN
5. Design Flow Rate: per manufacturer
6. Selected Unit Flow Range Limits: per manufacturer
7. Pressure Loss at Design Flow Rate: per manufacturer
8. Body: **Cast iron with interior lining complying with AWWA C550 or that is FDA approved.**
9. End Connections: Flanged.
10. Configuration: Designed for **horizontal, straight through** flow.
11. Accessories:
 - a. Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
 - c. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

D. Backflow Preventer Test Kits:

1. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.4 WATER METER BOXES

- A. Description: Cast-iron body and cover for disc-type water meter, with lettering "WATER METER" in cover; and with slotted, open-bottom base section of length to fit over service piping.
 1. Option: Base section may be cast-iron, PVC, clay, or other pipe.
- B. Description: Cast-iron body and double cover for disc-type water meter, with lettering "WATER METER" in top cover; and with separate inner cover; air space between covers; and slotted, open-bottom base section of length to fit over service piping.
- C. Description: Polymer-concrete body and cover for disc-type water meter, with lettering "WATER" in cover; and with slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb minimum over 10 by 10 inches (6800 kg minimum over 254 by 254 mm) square.

2.5 FIRE HYDRANTS

A. Wet-Barrel Fire Hydrants:

1. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet. Include interior coating according to AWWA C550.
 - a. Standard: AWWA C503.
 - b. Pressure Rating: 150 psig (1035 kPa) minimum.

2. Description: Freestanding, with one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, NPS 6 (DN 150) threaded or flanged inlet, and base section with NPS 6 (DN 150) mechanical-joint inlet.
 - a. Standards: UL 246 and FMG approved.
 - b. Pressure Rating: 150 psig (1035 kPa) minimum.
 - c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - d. Operating and Cap Nuts: Pentagon, 1-1/2 inches (38 mm) point to flat.
 - e. Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
 - f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

2.6 FLUSHING HYDRANTS

A. Post-Type Flushing Hydrants:

1. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - a. Pressure Rating: 150 psig (1035 kPa) minimum.
 - b. Outlet: One, with horizontal discharge.
 - c. Hose Thread: NPS 2-1/2 (DN 65), with NFPA 1963 external hose thread for use by local fire department, and with cast-iron cap with brass chain.
 - d. Barrel: Cast-iron or steel pipe with breakaway feature.
 - e. Valve: Bronze body with bronze-ball or plunger closure, and automatic draining.
 - f. Security: Locking device for padlock.
 - g. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
 - h. Inlet: NPS 2 (DN 50) minimum.
 - i. Operating Wrench: One for each unit.

B. Ground-Type Flushing Hydrants:

1. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - a. Pressure Rating: 150 psig (1035 kPa) minimum.
 - b. Outlet: One, with **vertical** discharge.
 - c. Hose Thread: NPS 2-1/2 (DN 65), with NFPA 1963 external hose thread for use by local fire department, and with cast-iron cap with brass chain.
 - d. Barrel: Cast-iron or steel pipe.
 - e. Valve: Bronze body with bronze-ball or plunger closure, and automatic draining.
 - f. Inlet: NPS 2 (DN 50) minimum.
 - g. Hydrant Box: Cast iron with cover, for ground mounting.
 - h. Operating Wrench: One for each unit.

C. Post-Type Sampling Station:

1. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - a. Pressure Rating: 100 psig (690 kPa) minimum.
 - b. Sampling Outlet: One unthreaded nozzle with handle.

- c. Valve: Bronze body with bronze-ball or plunger closure. Include operating handle.
- d. Drain: Tubing with separate manual vacuum pump.
- e. Inlet: NPS 3/4 (DN 20) minimum.
- f. Housing: Weatherproof material with locking device. Include anchor device.
- g. Operating Wrench: One for each unit.

2.7 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- (460-mm-) high brass sleeve; and round escutcheon plate.
 - a. Standard: UL 405.
 - b. Connections: Two NPS 2-1/2 (DN 65) inlets and one **NPS 4 (DN 100)** outlet.
 - c. Connections: **Three** NPS 2-1/2 (DN 65) inlets and one NPS 6 (DN 150) outlet.
 - d. Connections: Six NPS 2-1/2 (DN 65) inlets and one **NPS 6 (DN 150)** outlet.
 - e. Inlet Alignment: **Inline, horizontal**
 - f. Finish Including Sleeve: **Polished chrome-plated.**
 - g. Escutcheon Plate Marking: "**AUTO SPKR & STANDPIPE.**"

2.8 ALARM DEVICES

- A. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.
- B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig (1725-kPa) working pressure; designed for horizontal or vertical installation; with 2 single-pole, double-throw circuit switches to provide 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 when cover is removed.
- C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.
- D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 31 2000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground Fire-Service-Main Piping **NPS 4 to NPS 12 (DN 100 to DN 300), 6"** shall be the following:
 - 1. PVC, Type per plan, pipe listed for fire-protection service; PVC Class 200 fabricated fittings; and gasketed joints.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 (DN 80) and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 (DN 50) and smaller installation.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. See Section 33 0500 "Common Work Results for Utilities" for piping-system common requirements.

3.5 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:
 - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 (DN 50) and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
 2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
 4. Install corporation valves into service-saddle assemblies.
 5. Install manifold for multiple taps in water main.
 6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Comply with NFPA 24 for fire-service-main piping materials and installation.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
 2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- G. Install PE pipe according to ASTM D 2774 and ASTM F 645.
- H. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- I. Install fiberglass AWWA pipe according to AWWA M45.
- J. Bury piping with depth of cover over top at least **30 inches (750 mm)**
- K. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- L. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- M. Sleeves are specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- N. Mechanical sleeve seals are specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- O. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- P. See Section 21 1200 "Fire-Suppression Standpipes," Section 21 1313 "Wet-Pipe Sprinkler Systems," and Section 21 1316 "Dry-Pipe Sprinkler Systems" for fire-suppression-water piping inside the building.
- Q. See Section 22 1116 "Domestic Water Piping" for potable-water piping inside the building.

3.6 JOINT CONSTRUCTION

- A. See Section 33 0500 "Common Work Results for Utilities" for basic piping joint construction.
- B. Make pipe joints according to the following:
 - 1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
 - 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 - 3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 - 4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
 - 5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
 - 6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 - 7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.

3.7 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 - 3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
 - 4. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

- C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
- E. MSS Valves: Install as component of connected piping system.
- F. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- G. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves. **Install full-size valved bypass.**
- H. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.

3.9 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.
- D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.10 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install ball drip valves at each check valve for fire department connection to mains.
- B. Install protective pipe bollards **on two sides of** each fire department connection. Pipe bollards are specified in Section 05 5000 "Metal Fabrications."

3.11 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:

1. Valves: Install chain and padlock on open OS&Y gate valve.
2. Post Indicators: Install padlock on wrench on indicator post.

- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
- F. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Section 28 4621.11 "Addressable Fire-Alarm Systems" and Section 28 4621.13 "Conventional Fire-Alarm Systems."

3.12 CONNECTIONS

- A. See Section 33 0500 "Common Work Results for Utilities" for piping connections to valves and equipment.
- B. Connect water-distribution piping **existing water main**.
- C. Connect water-distribution piping to interior **fire-suppression** piping.
- D. Connect waste piping from concrete vault drains to **sanitary sewerage system**. See **Section 22 1313 "Facility Sanitary Sewers" for connection to sanitary-sewer** piping.
- E. Ground equipment according to Section 26 0526 "Grounding and Bonding for Electrical Systems."
- F. Connect wiring according to Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

3.13 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.14 IDENTIFICATION

- A. Install continuous underground **detectable** warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 31 2000 "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Section 33 0500 "Common Work Results for Utilities" for identifying devices.

3.15 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 1113

SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Ductile-iron pipe and fittings.
3. Galvanized steel pipe and fittings.
4. CPVC piping.
5. PEX tube and fittings.
6. PVC pipe and fittings.
7. PP pipe and fittings.
8. Piping joining materials.
9. Transition fittings.
10. Dielectric fittings.

B. Related Requirements:

1. Section 22 1113 "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.

1.2 ACTION SUBMITTALS

- ##### A. Product Data: For transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

- ##### A. System purging and disinfecting activities report.
- ##### B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- ##### A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- ##### B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."
- ##### C. Comply with NSF 372 for low lead.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint or threaded ends.
- G. Copper Pressure-Seal-Joint Fittings:
 - 1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
 - 2. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
- H. Copper Push-on-Joint Fittings:
 - 1. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
 - 2. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

2.3 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe:
 - 1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - 2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Standard-Pattern, Mechanical-Joint Fittings:
 - 1. AWWA C110/A21.10, ductile or gray iron.
 - 2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- C. Compact-Pattern, Mechanical-Joint Fittings:
 - 1. AWWA C153/A21.53, ductile iron.

2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 GALVANIZED-STEEL PIPE AND FITTINGS

A. Galvanized-Steel Pipe:

1. ASTM A 53/A 53M, Type E,, Standard Weight.
2. Include ends matching joining method.

B. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless steel pipe with threaded ends.

C. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Malleable-Iron Unions:

1. ASME B16.39, Class 150.
2. Hexagonal-stock body.
3. Ball-and-socket, metal-to-metal, bronze seating surface.
4. Threaded ends.

E. Flanges: ASME B16.1, Class 125, cast iron.

2.5 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.

G. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

H. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.6 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Charlotte Pipe and Foundry Company.
 - b. Harvel Plastics, Inc.
2. Description:
 - a. PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
 - b. One end with threaded brass insert and one solvent-cement-socket end.

D. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. NIBCO INC.
 - b. Spears Manufacturing Company.
2. Description:
 - a. PVC four-part union.
 - b. Brass or stainless-steel threaded end.
 - c. Solvent-cement-joint or threaded plastic end.
 - d. Rubber O-ring.
 - e. Union nut.

2.7 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. Jomar Valve.
 - b. WATTS.

- c. Zurn Industries, LLC.
 - 2. Standard: ASSE 1079.
 - 3. Pressure Rating: 125 psig minimum at 180 deg F.
 - 4. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. WATTS.
 - b. Zurn Industries, LLC.
 - 2. Standard: ASSE 1079.
 - 3. Factory-fabricated, bolted, companion-flange assembly.
 - 4. Pressure Rating: 125 psig minimum at 180 deg F.
 - 5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric-Flange Insulating Kits:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - 2. Nonconducting materials for field assembly of companion flanges.
 - 3. Pressure Rating: 150 psig.
 - 4. Gasket: Neoprene or phenolic.
 - 5. Bolt Sleeves: Phenolic or polyethylene.
 - 6. Washers: Phenolic with steel backing washers.
- E. Dielectric Nipples:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Grinnell Mechanical Products.
 - b. Victaulic Company.
 - 2. Standard: IAPMO PS 66.
 - 3. Electroplated steel nipple complying with ASTM F 1545.
 - 4. Pressure Rating and Temperature: 300 psig at 225 deg F.
 - 5. End Connections: Male threaded or grooved.
 - 6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Comply with requirements in Section 31 2000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 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 copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 22 0519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 22 1119 "Domestic Water Piping Specialties."
- E. Install shutoff valve immediately upstream of each dielectric fitting.
- F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 22 1119 "Domestic Water Piping Specialties."
- G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- I. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- K. 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.
- L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- M. Install piping to permit valve servicing.

- N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- O. Install piping free of sags and bends.
- P. Install fittings for changes in direction and branch connections.
- Q. Install PEX tubing with loop at each change of direction of more than 90 degrees.
- R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- S. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 22 0519 "Meters and Gages for Plumbing Piping."
- T. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 22 1123 "Domestic Water Pumps."
- U. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 22 0519 "Meters and Gages for Plumbing Piping."
- V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 0518 "Escutcheons for Plumbing Piping."

3.3 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 pipes, tubes, 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.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Braze Joints" chapter.
- E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

- F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- H. Joint Construction for Solvent-Cemented Plastic Piping: 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. PVC Piping: Join according to ASTM D 2855.
- I. Joints for PEX Tubing: Join according to ASTM F 1807 for metal insert and copper crimp ring fittings and ASTM F 1960 for cold expansion fittings and reinforcing rings.
- J. Joints for PEX Tubing: Join according to ASSE 1061 for push-fit fittings.
- K. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
 - 1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
 - 2. Fittings for NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
- D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices in Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- B. Comply with requirements for pipe hanger, support products, and installation in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."
1. Vertical Piping: MSS Type 8 or 42, clamps.
 2. Individual, Straight, Horizontal Piping Runs:
 - 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 if Indicated: MSS Type 49, spring cushion rolls.
 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. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. 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.
- F. Install supports for vertical copper tubing every 10 feet.
- G. 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.
- H. Install supports for vertical steel piping every 15 feet.
- I. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
 2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
 3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
 4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 5. NPS 6: 48 inches with 3/4-inch rod.

- 6. NPS 8: 48 inches with 7/8-inch rod.
- J. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.
- K. Install vinyl-coated hangers for PEX tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.
- L. Install hangers for vertical PEX tubing every 48 inches.
- M. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
 - 2. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6: 48 inches with 3/4-inch rod.
 - 5. NPS 8: 48 inches with 7/8-inch rod.
- N. Install supports for vertical PVC piping every 48 inches.
- O. Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for 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; extend and connect to the following:
 - 1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
 - 2. Water Heaters: Cold-water inlet 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 that required by plumbing code.
 - 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 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in Section 22 0553 "Identification for Plumbing Piping and Equipment."
- B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Piping Inspections:

- a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
- b. During installation, notify authorities having jurisdiction at least one day 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 authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
- c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
- d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

- a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
- b. 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 a separate report for each test, complete with diagram of portion of piping tested.
- c. 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.
- d. 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 it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.

- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.10 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 hot-water flow in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 5. Remove plugs used during testing of piping and 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.

3.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures 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. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

- 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 and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be one of the following:
 - 1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
 - 2. PVC, Schedule 80; socket fittings; and solvent-cemented joints.
- E. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 and larger, shall be one of the following:
 - 1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
 - 2. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.
 - 3. PVC, Schedule 80; socket fittings; and solvent-cemented joints.
- F. Under-building-slab, domestic water piping, NPS 2 and smaller, shall be one of the following:
 - 1. Hard or soft copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
 - 2. PVC, Schedule 40; socket fittings; and solvent-cemented joints.
- G. Aboveground domestic water piping, NPS 2 and smaller, shall be the following:
 - 1. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - 2. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.
- H. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

END OF SECTION 22 1116

SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Water pressure-reducing valves.
3. Balancing valves.
4. Temperature-actuated, water mixing valves.
5. Strainers.
6. Hose bibbs.
7. Wall hydrants.
8. Drain valves.
9. Water-hammer arresters.
10. Trap-seal primer valves.

B. Related Requirements:

1. Section 22 0519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 22 1116 "Domestic Water Piping" for water meters.

1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- ##### A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- ##### A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- ##### A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

- A. Intermediate Atmospheric-Vent Backflow Preventers:

1. Standard: ASSE 1012.
2. Operation: Continuous-pressure applications.
3. Size: NPS 3/4.
4. Body: Bronze.
5. End Connections: Union, solder joint.
6. Finish: Chrome plated.

- B. Reduced-Pressure-Principle Backflow Preventers:

1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig maximum, through middle third of flow range.
4. Size: See Plans.
5. Design Flow Rate: See plans.
6. Selected Unit Flow Range Limits: See plans.
7. Pressure Loss at Design Flow Rate: See Plans for sizes NPS 2 and smaller; See plans for NPS 2-1/2 and larger.
8. Body: Bronze for NPS 2 and smaller; steel with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
9. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
10. Configuration: Designed for horizontal, straight-through flow.
11. Accessories:
 - a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
 - b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
 - c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

- C. Double-Check, Backflow-Prevention Assemblies:

1. Standard: ASSE 1015.
2. Operation: Continuous-pressure applications unless otherwise indicated.
3. Pressure Loss: 5 psig maximum, through middle third of flow range.
4. Size: See plans.
5. Design Flow Rate: See plans.
6. Selected Unit Flow Range Limits: See plans.
7. Pressure Loss at Design Flow Rate: See plans for sizes NPS 2 and smaller; See plans for NPS 2-1/2 and larger.
8. Body: Bronze for NPS 2 and smaller; steel with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
9. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
10. Configuration: Designed for horizontal, straight-through flow.
11. Accessories:

- a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
- b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.4 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
 - b. Cash Acme.
 - c. WATTS.
 - d. Zurn Industries, LLC.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial working pressure of 150 psig.
4. Size: See plans.
5. Design Flow Rate: See plans.
6. Design Inlet Pressure: See plans.
7. Design Outlet Pressure Setting: See plans.
8. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
9. Valves for Booster Heater Water Supply: Include integral bypass.
10. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.5 BALANCING VALVES

A. Memory-Stop Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Apollo Flow Controls; Conbraco Industries, Inc.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Red White Valve Corp.
 - f. Stockham; Crane Energy Flow Solutions.
2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
3. Pressure Rating: 400-psig minimum CWP.
4. Size: NPS 2 or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass.
8. Seats and Seals: Replaceable.
9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Armstrong International, Inc.
 - b. Cash Acme.
 - c. Leonard Valve Company.
 - d. POWERS; A WATTS Brand.
 - e. Symmons Industries, Inc.
 - f. TACO Comfort Solutions, Inc.
 - g. WATTS.
 - h. Zurn Industries, LLC.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Tempered-Water Setting: See plans.
9. Tempered-Water Design Flow Rate: See plans.
10. Valve Finish: Chrome plated.

B. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Leonard Valve Company.
 - b. Powers.
 - c. Armstrong.
 - d. POWERS; A WATTS Brand.
 - e. Symmons Industries, Inc.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Tempered-Water Setting: See plans.
9. Tempered-Water Design Flow Rate: See plans.
10. Selected Valve Flow Rate at 45-psig Pressure Drop: See plans.
11. Pressure Drop at Design Flow Rate: See plans.
12. Valve Finish: Chrome plated Polished, chrome plated Rough bronze.
13. Piping Finish: Copper.

2.7 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
 - a. Strainers NPS 2 and Smaller: 0.020 inch.
 - b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
 - c. Strainers NPS 5 and Larger: 0.10 inch.
6. Drain: Factory-installed, hose-end drain valve.

2.8 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral nonremovable, 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: Rough bronze.
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.

2.9 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

1. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
2. Pressure Rating: 125 psig.
3. Operation: Loose key.
4. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
5. Inlet: NPS 3/4 or NPS 1.
6. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
7. Box: Deep, flush mounted with cover.

8. Box and Cover Finish: Polished nickel bronze.
9. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
10. Nozzle and Wall-Plate Finish: Polished nickel bronze.
11. Operating Keys(s): Two with each wall hydrant.

B. Nonfreeze, Hot- and Cold-Water Wall Hydrants:

1. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
2. Pressure Rating: 125 psig.
3. Operation: Loose key.
4. Casing and Operating Rods: Of length required to match wall thickness. Include wall clamps.
5. Inlet: NPS 3/4 or NPS 1.
6. Outlet: Concealed.
7. Box: Deep, flush mounted with cover.
8. Box and Cover Finish: Polished nickel bronze.
9. Vacuum Breaker:
 - a. Nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
 - b. Garden-hose thread complying with ASME B1.20.7 on outlet.
10. Operating Keys(s): Two with each wall hydrant.

C. Moderate-Climate Wall Hydrants:

1. Standard: ASME A112.21.3M for exposed-outlet, self-draining wall hydrants.
2. Pressure Rating: 125 psig.
3. Operation: Loose key.
4. Inlet: NPS 3/4 or NPS 1.
5. Outlet:
 - a. Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
 - b. Garden-hose thread complying with ASME B1.20.7.
6. Box: Deep, flush mounted with cover.
7. Box and Cover Finish: Polished nickel bronze.
8. Outlet:
 - a. Concealed, with integral vacuum breaker or nonremovable hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052.
 - b. Garden-hose thread complying with ASME B1.20.7.
9. Nozzle and Wall-Plate Finish: Polished nickel bronze.
10. Operating Keys(s): Two with each wall hydrant.

D. Vacuum Breaker Wall Hydrants:

1. Standard: ASSE 1019, Type A or Type B.

2. Type: Freeze-resistant, automatic draining with integral air-inlet valve.
3. Classification: Type A, for automatic draining with hose removed or Type B, for automatic draining with hose removed or with hose attached and nozzle closed.
4. Pressure Rating: 125 psig.
5. Operation: Loose key.
6. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
7. Inlet: NPS 1/2 or NPS 3/4.
8. Outlet: Exposed with garden-hose thread complying with ASME B1.20.7.

2.10 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: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.11 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. AMTROL, Inc.
 - b. Jay R. Smith Mfg. Co.
 - c. Precision Plumbing Products.
 - d. Sioux Chief Manufacturing Company, Inc.
 - e. WATTS.
 - f. Zurn Industries, LLC.
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.

2.12 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

- a. Jay R. Smith Mfg. Co.
 - b. Precision Plumbing Products.
 - c. WATTS.
 - d. Zurn Industries, LLC.
2. Standard: ASSE 1018.
 3. Pressure Rating: 125 psig minimum.
 4. Body: Bronze.
 5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
 6. Gravity Drain Outlet Connection: NPS 1/2 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 Device:
1. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
 - a. Jay R. Smith Mfg. Co.
 2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
 3. Size: NPS 1-1/4 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.
 3. Do not install bypass piping around backflow preventers.
- B. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.
- C. Install balancing valves in locations where they can easily be adjusted.
- D. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
1. Install cabinet-type units recessed in or surface mounted on wall as specified.
- E. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve.

- F. Set nonfreeze, nondraining-type post hydrants in concrete or pavement.
- G. Set freeze-resistant yard hydrants with riser pipe in concrete or pavement. Do not encase canister in concrete.
- H. Install water-hammer arresters in water piping according to PDI-WH 201.
- I. 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.
- J. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

3.2 CONNECTIONS

- A. Comply with requirements for ground equipment in Section 26 0526 "Grounding and Bonding for Electrical Systems."
- B. Fire-retardant-treated-wood blocking is specified in Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow set points of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 22 1119

SECTION 22 1313 - FACILITY SANITARY SEWERS

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. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless cast-iron soil pipe and fittings.
3. Ductile-iron, gravity sewer pipe and fittings.
4. Ductile-iron, pressure pipe and fittings.
5. ABS pipe and fittings.
6. PVC pipe and fittings.
7. Fiberglass pipe and fittings.
8. Concrete pipe and fittings.
9. Nonpressure-type transition couplings.
10. Pressure-type pipe couplings.
11. Expansion joints and deflection fittings.
12. Backwater valves.
13. Cleanouts.
14. Encasement for piping.
15. Manholes.
16. Concrete.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Pipe and fittings.
2. Non-pressure and pressure couplings
3. Expansion joints and deflection fittings.
4. Backwater valves.
5. Cleanouts.

- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
2. Show system piping in profile. Draw profiles to horizontal scale of not less than 1 inch equals 50 feet (1:500) and to vertical scale of not less than 1 inch equals 5 feet (1:50). Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

B. Product Certificates: For each type of pipe and fitting.

C. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

1.7 FIELD CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify **Construction Manager** fewer than days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without **Construction Manager's** written permission.

PART 2 - PRODUCTS

2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, **Service class**.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI-Trademark, Shielded Couplings:
 - 1. Description: ASTM C 1277 and CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Heavy-Duty, Shielded Couplings:
 - 1. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- D. Cast-Iron, Shielded Couplings:
 - 1. Description: ASTM C 1277 with ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- E. Unshielded Couplings:
 - 1. Description: ASTM C 1277 and ASTM C 1461, rigid, sleeve-type, reducing- or transition-type mechanical coupling, with integral, center pipe stop, molded from ASTM C 1440, thermoplastic elastomer (TPE) material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

- A. Pipe: ASTM A 746, for push-on joints.
- B. Standard Fittings: AWWA C110/A21.10, ductile or gray iron, for push-on joints.
- C. Compact Fittings: AWWA C153/A21.53, ductile iron, for push-on joints.
- D. Gaskets: AWWA C111/A21.11, rubber.

2.4 DUCTILE-IRON, PRESSURE PIPE AND FITTINGS

- A. Push-on-Joint Piping:
 - 1. Pipe: AWWA C151/A21.51.
 - 2. Standard Fittings: AWWA C110/A21.10, ductile or gray iron.
 - 3. Compact Fittings: AWWA C153/A21.53.
 - 4. Gaskets: AWWA C111/A21.11, rubber, of shape matching pipe and fittings.
- B. Mechanical-Joint Piping:

1. Pipe: AWWA C151/A21.51, with bolt holes in bell.
2. Standard Fittings: AWWA C110/A21.10, ductile or gray iron, with bolt holes in bell.
3. Compact Fittings: AWWA C153/A21.53, with bolt holes in bells.
4. Glands: Cast or ductile iron; with bolt holes and high-strength, cast-iron or high-strength, low-alloy steel bolts and nuts.
5. Gaskets: AWWA C111/A21.11, rubber, of shape matching pipe, fittings, and glands.

2.5 ABS PIPE AND FITTINGS

- A. ABS Sewer Pipe and Fittings: ASTM D 2661, with bell-and-spigot ends for gasketed joints.
 1. NPS 3 to NPS 6 (DN 80 to DN 150): SDR 35.
 2. NPS 8 to NPS 12 (DN 200 to DN 300): SDR 42.
- B. Gaskets: ASTM F 477, elastomeric seals.

2.6 PVC PIPE AND FITTINGS

- A. PVC Cellular-Core Sewer Piping:
 1. Pipe: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, PVC cellular-core pipe with plain ends for solvent-cemented joints.
 2. Fittings: ASTM D 3034, **SDR 35** PVC socket-type fittings.
- B. PVC Corrugated Sewer Piping:
 1. Pipe: ASTM F 949, PVC corrugated pipe with bell-and-spigot ends for gasketed joints.
 2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
 3. Gaskets: ASTM F 477, elastomeric seals.
- C. PVC Profile Sewer Piping:
 1. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
 2. Fittings: ASTM D 3034, PVC with bell ends.
 3. Gaskets: ASTM F 477, elastomeric seals.
- D. PVC Type PSM Sewer Piping:
 1. Pipe: ASTM D 3034, **SDR 35** PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 2. Fittings: ASTM D 3034, PVC with bell ends.
 3. Gaskets: ASTM F 477, elastomeric seals.
- E. PVC Gravity Sewer Piping:
 1. Pipe and Fittings: ASTM F 679, **T-2** wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.
- F. PVC Pressure Piping:

1. Pipe: AWWA C900, **Class 200** PVC pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: AWWA C900, **Class 200** PVC pipe with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.7 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 2. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.
 3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded, Flexible Couplings:
 1. Description: Elastomeric sleeve with **stainless-steel shear ring and** corrosion-resistant-metal tension band and tightening mechanism on each end.
- D. Shielded, Flexible Couplings:
 1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- E. Ring-Type, Flexible Couplings:
 1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
- F. Nonpressure-Type, Rigid Couplings:
 1. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling; molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.8 EXPANSION JOINTS AND DEFLECTION FITTINGS

- A. Ductile-Iron, Flexible Expansion Joints:
 1. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig (1725-kPa) minimum working pressure and for offset and expansion indicated.

B. Ductile-Iron Expansion Joints:

1. Description: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include rating for 250-psig (1725-kPa) minimum working pressure and for expansion indicated.

C. Ductile-Iron Deflection Fittings:

1. Description: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include rating for 250-psig (1725-kPa) minimum working pressure and for up to 15 degrees of deflection.

2.9 BACKWATER VALVES

A. PVC Backwater Valves:

1. Description: Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

2.10 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): **Heavy Duty**
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.11 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350 (ACI 350M), and the following:

1. Cement: ASTM C 150/C 150M, Type II.
2. Fine Aggregate: ASTM C 33/C 33M, sand.
3. Coarse Aggregate: ASTM C 33/C 33M, crushed gravel.
4. Water: Potable.

- B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420-MPa) deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A1064/A 1064M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420-MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 2000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1.5 percent unless otherwise indicated.
 - 2. Install piping, 4", and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with **36-inch (915-mm)** minimum cover.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 6. Install ductile-iron, gravity sewer piping according to ASTM A 746.
 7. Install ABS sewer piping according to ASTM D 2321 and ASTM F 1668.
 8. Install PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 1668.
 9. Install PVC corrugated sewer piping according to ASTM D 2321 and ASTM F 1668.
 10. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668.
 11. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
 12. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
 13. Install fiberglass sewer piping according to ASTM D 3839 and ASTM F 1668.
 14. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
 15. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105/A21.5:
1. Hub-and-spigot, cast-iron soil pipe.
 2. Hubless cast-iron soil pipe and fittings.
 3. Ductile-iron pipe and fittings.
 4. Expansion joints and deflection fittings.
- H. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
 3. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
 4. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
 5. Join ABS sewer piping according to ASTM D 2321 for elastomeric-seal joints.
 6. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 7. Join PVC corrugated sewer piping according to ASTM D 2321.
 8. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 9. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 10. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 11. Join fiberglass sewer piping according to ASTM D 4161 for elastomeric-seal joints.
 12. Join nonreinforced-concrete sewer piping according to ASTM C 14 (ASTM C 14M) and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.

13. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
14. Join dissimilar pipe materials with nonpressure-type, flexible couplings.

B. Join force-main, pressure piping according to the following:

1. Join ductile-iron pressure piping according to AWWA C600 or AWWA M41 for push-on joints.
2. Join ductile-iron special fittings according to AWWA C600 or AWWA M41 for push-on joints.
3. Join PVC pressure piping according to AWWA M23 for gasketed joints.
4. Join PVC water-service piping according to ASTM D 2855.
5. Join dissimilar pipe materials with pressure-type couplings.

C. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. **Unshielded** flexible couplings for pipes of same or slightly different OD.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
2. Use pressure pipe couplings for force-main joints.

3.4 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.5 BACKWATER VALVE INSTALLATION

- A. Install horizontal-type backwater valves in piping manholes or pits.
- B. Install combination horizontal and manual gate-type valves in piping and in manholes.
- C. Install terminal-type backwater valves on end of piping and in manholes. Secure units to sidewalls.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
1. Use Heavy-Duty, top-loading classification cleanouts in **vehicle-traffic service** areas.

- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, **18 by 18 by 12 inches (450 by 450 by 300 mm)** deep. Set with flush with surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 22 1316 "Sanitary Waste and Vent Piping."
- B. Connect force-main piping to building's sanitary force mains specified in Section 22 1316 "Sanitary Waste and Vent Piping." Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch (150-mm) overlap with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
 - 3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa) unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least **8-inch- (203-mm-)** thick, brick masonry bulkheads.

2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
1. Remove manhole and close open ends of remaining piping.
 2. Remove top of manhole down to at least **36 inches (915 mm)** below final grade. Fill to within **12 inches (300 mm)** of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Section 312000 "Earth Moving."

3.9 IDENTIFICATION

- A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
1. Use **warning tape** or detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of Project.
1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.

4. Submit separate report for each test.
 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Fill sewer piping with water. Test with pressure of at least 10-foot (3-m) head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Test concrete gravity sewer piping according to ASTM C 1628.
 7. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than **150 psig (1035 kPa)**.
 - a. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
 - b. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
 8. Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.11 CLEANING

- A. Clean dirt and superfluous material from interior of piping. **Flush with potable water.**

END OF SECTION 221313

SECTION 22 1316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hub-and-spigot, cast-iron soil pipe and fittings.
 - 2. Copper tube and fittings.
 - 3. ABS pipe and fittings.
 - 4. PVC pipe and fittings.
 - 5. Specialty pipe fittings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.
- B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 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 withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 PIPING MATERIALS

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 COPPER TUBE AND FITTINGS

- A. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.
- B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solderjoint fittings.
- C. Copper Pressure Fittings:
 - 1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- D. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 - 1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8inch maximum thickness unless thickness or specific material is indicated.
 - 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated. E.

Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 ABS PIPE AND FITTINGS

- A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
- B. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40.
- C. Cellular-Core ABS Pipe: ASTM F 628, Schedule 40.
- D. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
- E. Solvent Cement: ASTM D 2235.

2.6 PVC PIPE AND FITTINGS

- A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
- B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- E. Adhesive Primer: ASTM F 656.
- F. Solvent Cement: ASTM D 2564.

2.7 SPECIALTY PIPE FITTINGS A.

Transition Couplings:

- 1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- 2. Unshielded, Nonpressure Transition Couplings:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Dallas Specialty & Mfg. Co.
 - 2) Fernco Inc.
 - 3) Mission Rubber Company, LLC; a division of MCP Industries.
 - 4) Plastic Oddities.
 - b. Standard: ASTM C 1173.
 - c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - d. End Connections: Same size as and compatible with pipes to be joined.
 - e. Sleeve Materials:
 - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- 3. Shielded, Nonpressure Transition Couplings:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Cascade Waterworks Mfg. Co.
 - 2) Mission Rubber Company, LLC; a division of MCP Industries.
- b. Standard: ASTM C 1460.
 - c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - d. End Connections: Same size as and compatible with pipes to be joined.
4. Vandal Proof Vent Caps:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Zurn.
 - 2) JR Smith
 - b. Description: Vandal proof end cap for vent pipes that terminate thru roof.

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 31 2000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations 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 specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.

- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
 - 1. 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.
 - 2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 - 3. Do not change direction of flow more than 90 degrees.
 - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of waste piping in direction of flow is prohibited.
- L. Lay buried building waste piping beginning at low point of each system.
 - 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
 - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 - 3. Maintain swab in piping and pull past each joint as completed.
- M. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- N. 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."
- O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- P. Install aboveground ABS piping according to ASTM D 2661.

- Q. Install aboveground PVC piping according to ASTM D 2665.
- R. Install underground ABS and PVC piping according to ASTM D 2321.
- S. Plumbing Specialties:
 - 1. Install backwater valves in sanitary waster gravity-flow piping.
 - a. Comply with requirements for backwater valves specified in Section 22 1319 "Sanitary Waste Piping Specialties."
 - 2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
 - a. Comply with requirements for cleanouts specified in Section 22 1319 "Sanitary Waste Piping Specialties."
 - 3. Install drains in sanitary waste gravity-flow piping.
 - a. Comply with requirements for drains specified in Section 22 1319 "Sanitary Waste Piping Specialties."
- T. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- U. Install sleeves for piping penetrations of walls, ceilings, and floors.
 - 1. Comply with requirements for sleeves specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- V. Install sleeve seals for piping penetrations of concrete walls and slabs.
 - 1. Comply with requirements for sleeve seals specified in Section 22 0517 "Sleeves and Sleeve Seals for Plumbing Piping."
- W. Install escutcheons for piping penetrations of walls, ceilings, and floors.
 - 1. Comply with requirements for escutcheons specified in Section 22 0518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

- C. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
- D. Plastic, Nonpressure-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.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
 - 3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in ODs.
 - 2. In Waste Drainage Piping: Shielded, nonpressure transition couplings.

3.5 VALVE INSTALLATION

- A. Comply with requirements in Section 22 0523.12 "Ball Valves for Plumbing Piping," Section 22 0523.13 "Butterfly Valves for Plumbing Piping," Section 22 0523.14 "Check Valves for Plumbing Piping," and Section 22 0523.15 "Gate Valves for Plumbing Piping" for general duty valve installation requirements. B. Shutoff Valves:
 - 1. Install shutoff valve on each sewage pump discharge.
 - 2. Install gate or full-port ball valve for piping NPS 2 and smaller.
 - 3. Install gate valve for piping NPS 2-1/2 and larger.
- C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.
- D. Backwater Valves: Install backwater valves in piping subject to backflow.
 - 1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
 - 2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
 - 3. Install backwater valves in accessible locations.
 - 4. Comply with requirements for backwater valve specified in Section 22 1319 "Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."
1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
 3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
 5. Vertical Piping: MSS Type 8 or Type 42, clamps.
 6. Install individual, straight, horizontal piping runs:
 - 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 if Indicated: MSS Type 49, spring cushion rolls.
 7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 8. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch 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: 60 inches with 3/8-inch rod.
 2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
 6. 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.
- H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 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: 12 feet with 1/2-inch rod.
 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
 7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
 8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod. I. Install supports for vertical steel piping every 15 feet.

- J. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 2: 84 inches with 3/8-inch rod.
 - 2. NPS 3: 96 inches with 1/2-inch rod.
 - 3. NPS 4: 108 inches with 1/2-inch rod.
 - 4. NPS 6: 10 feet with 5/8-inch rod.
- K. Install supports for vertical stainless-steel piping every 10 feet.
- L. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 4. NPS 3 and NPS 5: 10 feet with 1/2-inch rod.
 - 5. NPS 6: 10 feet with 5/8-inch rod.
 - 6. NPS 8: 10 feet with 3/4-inch rod.
- M. Install supports for vertical copper tubing every 10 feet.
- N. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
 - 5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.
- O. Install supports for vertical ABS and PVC piping every 48 inches.
- P. Support piping and tubing not listed above according to MSS SP-58 and manufacturer's written instructions.

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 waste and vent piping to the following:
 - 1. Plumbing Fixtures: Connect waste 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 waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Equipment: Connect waste piping as indicated.
 - a. Provide shutoff valve if indicated and union for each connection.
 - b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping.
- B. Comply with requirements for identification specified in Section 22 0553 "Identification for Plumbing Piping and Equipment."

3.9 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 waste 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.

- a. 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 waste and vent piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
 - a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
 - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. 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.
 - a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
 - b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
 - c. Air pressure must remain constant without introducing additional air throughout period of inspection.
 - d. 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. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping 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.
- D. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.
- E. Repair damage to adjacent materials caused by waste and vent piping installation.

3.11 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Copper Type DWV tube, copper drainage fittings, and soldered joints.
 - 3. Cellular-core ABS pipe, ABS socket fittings, and solvent-cemented joints.
 - 4. Cellular-core PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 5. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- C. Aboveground, vent piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Copper Type DWV tube, copper drainage fittings, and soldered joints.
 - a. Option for Vent Piping, NPS 2-1/2 and NPS 3-1/2: Hard copper tube, Type M; copper pressure fittings; and soldered joints.
 - 3. Cellular-core ABS pipe, ABS socket fittings, and solvent-cemented joints.
 - 4. Cellular-core PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 5. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.
- D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
 - 2. Cellular-core ABS pipe, ABS socket fittings, and solvent-cemented joints.
 - 3. Cellular-core PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 22 1316

SECTION 22 3300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Commercial, electric, domestic-water booster heaters.
2. Commercial, electric, storage, domestic-water heaters.
3. Commercial, light-duty, storage, electric, domestic-water heaters.
4. Residential, electric, storage, domestic-water heaters.
5. Thermostat-control, electric, tankless, domestic-water heaters.
6. Domestic-water heater accessories.

1.2 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."

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: For commercial domestic-water heaters, accessories, and components, from manufacturer.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Source quality-control reports.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 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. 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.
- C. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 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. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Electric, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Five years.
 - 2) Controls and Other Components: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

- A. Commercial, Electric, Storage, Domestic-Water Heaters:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Bradford White Corporation.
 - b. Rheem Manufacturing Company.
 - c. Smith, A. O. Corporation.
 - 2. Standard: UL 1453.
 - 3. Storage-Tank Construction: ASME-code, steel vertical arrangement.
 - a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.

- 2) NPS 2-1/2 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.
 - b. Pressure Rating: 150 psig.
 - c. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining material into tappings.
4. Factory-Installed Storage-Tank Appurtenances:
- a. Anode Rod: Replaceable magnesium.
 - b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - c. Insulation: Comply with ASHRAE/IESNA 90.1.
 - d. Jacket: Steel with enameled finish.
 - e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
 - f. Temperature Control: Adjustable thermostat.
 - g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. 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.
5. Special Requirements: NSF 5 construction.
- B. Commercial, Light-Duty, Storage, Electric, Domestic-Water Heaters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. American Water Heaters.
 - b. Bradford White Corporation.
 - c. Lochinvar, LLC.
 - d. Rheem Manufacturing Company.
 - e. Smith, A. O. Corporation.
 - f. State Industries.
 2. Standard: UL 174.
 3. Storage-Tank Construction: Steel, vertical arrangement.
 - a. Tappings: ASME B1.20.1 pipe thread.
 - b. Pressure Rating: 150 psig.
 - c. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining material into tappings.
 4. Factory-Installed Storage-Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
 - c. Drain Valve: ASSE 1005.
 - d. Insulation: Comply with ASHRAE/IESNA 90.1.

- e. Jacket: Steel with enameled finish.
 - f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - g. Heating Elements: Two; electric, screw-in immersion type; wired for simultaneous operation unless otherwise indicated. Limited to 12 kW total.
 - h. Temperature Control: Adjustable thermostat.
 - i. Safety Control: High-temperature-limit cutoff device or system.
 - j. Relief Valve: ASME rated and stamped for 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 valve with sensing element that extends into storage tank.
5. Special Requirements: NSF 5 construction with legs for off-floor installation.

C. Capacity and Characteristics:

- 1. Capacity: As shown on plumbing plans.
- 2. Recovery: As shown on plumbing plans.
- 3. Temperature Setting: 140 deg F.
- 4. Power Demand: As shown on plumbing plans.
- 5. Heating Elements:
 - a. Number of Elements: As shown on plumbing plans.
- 6. Electrical Characteristics:
 - a. Volts: As shown on plumbing plans.

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 or approved equal:
 - a. AMTROL, Inc.
 - b. Flexcon Industries.
- 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 Annex G 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.
 - b. Capacity Acceptable: 7 gal. minimum.

- B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.
- C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.
- D. Heat-Trap Fittings: ASHRAE 90.2.
- E. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig-maximum outlet pressure unless otherwise indicated.
- F. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. 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.
- G. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
- H. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- I. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- J. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.
- K. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.3 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 commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 01 4000 "Quality Requirements" for retesting and reinspecting requirements and Section 01 7300 "Execution" for requirements for correcting the Work.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base.
1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 2. Maintain manufacturer's recommended clearances.
 3. Arrange units so controls and devices that require servicing are accessible.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
 8. Anchor domestic-water heaters to substrate.
- B. Electric, Domestic-Water Heater Mounting: Install electric, domestic-water heaters on water-heater stand on floor.
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.
- C. 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 Section 22 0523.12 "Ball Valves for Plumbing Piping," Section 22 0523.13 "Butterfly Valves for Plumbing Piping," and Section 22 0523.15 "Gate Valves for Plumbing Piping."
- D. Install commercial, electric, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 22 0548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- E. 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.
- F. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. 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.

- G. 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 electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 22 1119 "Domestic Water Piping Specialties."
- H. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 22 0519 "Meters and Gages for Plumbing Piping."
- I. Install pressure-reducing valve with integral bypass relief valve in electric, domestic-water booster-heater inlet piping and water hammer arrester in booster-heater outlet piping. Set pressure-reducing valve for outlet pressure of 25 psig. Comply with requirements for pressure-reducing valves and water hammer arresters specified in Section 22 1119 "Domestic Water Piping Specialties."
- J. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.
- K. Fill electric, domestic-water heaters with water.
- L. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 1116 "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 Section 22 0553 "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 Section 01 4000 "Quality Requirements" for retesting and reinspecting requirements and Section 01 7300 "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

END OF SECTION 22 3300

SECTION 22 4213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.
4. Supports.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. Water Closets: Floor mounted, bottom outlet, top spud.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Standard.
2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Type: Siphon jet.
 - d. Style: Flushometer valve.
 - e. Height: Standard.
 - f. Rim Contour: Elongated.
 - g. Water Consumption: 1.28 gal. per flush.
 - h. Spud Size and Location: NPS 1-1/2; top.
 - i. Color: White.

3. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.
4. Flushometer Valve: See plumbing plans for model information.
5. Toilet Seat: See plumbing plans for model information.

2.2 FLUSHOMETER VALVES

A. Lever-Handle, Piston Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Sloan Valve Company.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Consumption: 1.28 gal. per flush.
10. Minimum Inlet: NPS 1.
11. Minimum Outlet: NPS 1-1/4.

2.3 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Church Seats; Bemis Manufacturing Company.
 - c. Olsonite Seat Co.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge: Check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.
3. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 22 0518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 07 9200 "Joint Sealants."

3.2 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 22 1116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 22 1316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.3 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.

3.4 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 4213.13

SECTION 22 4216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.
3. Supports.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 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 01 7823 "Operation and Maintenance Data," include the following:
 - a. Servicing and adjustments of automatic faucets.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

- A. Lavatory: Oval, vitreous china, undercounter mounted.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Standard.
 2. Fixture:

- a. Standard: ASME A112.19.2/CSA B45.1.
- b. Type: For undercounter mounting.
- c. Nominal Size: Oval, 19 by 16 inches.
- d. Faucet-Hole Punching: No holes.
- e. Faucet-Hole Location: On countertop.
- f. Color: White.
- g. Mounting Material: Sealant and undercounter mounting kit.

2.2 SOLID-BRASS, MANUALLY OPERATED FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: Manual-type, single-control mixing, commercial, solid-brass valve.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Standard.
 - b. Chicago Faucets; Geberit Company.
 - 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.
 - 8. Maximum Flow: 0.25 gal. per metering cycle.
 - 9. Mounting Type: Deck, exposed.
 - 10. Valve Handle(s): Single lever Wrist blade, 4 inches.
 - 11. Spout: Rigid type.
 - 12. Spout Outlet: Aerator Laminar flow.
 - 13. Operation: Compression, manual.
 - 14. Drain: Not part of faucet.

2.3 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "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: Wheel handle.

F. Risers:

1. NPS 1/2.
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 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-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-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 0518 "Escutcheons for Plumbing Piping."
- E. Seal joints between lavatories and 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 9200 "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 0719 "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 1116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 22 1316 "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.

END OF SECTION 22 4216.13

SECTION 22 4216.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service basins.
2. Service sinks.
3. Utility sinks.
4. Handwash sinks.
5. Sink faucets.
6. Laminar-flow, faucet-spout outlets.
7. Supports.
8. Supply fittings.
9. Waste fittings.

1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- ##### A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

- ##### A. Maintenance data.

PART 2 - PRODUCTS

2.1 SERVICE BASINS

- ##### A. Service Basins: Plastic, floor mounted.

1. Manufacturers: Subject to compliance with requirements and owner requirements, provide products by the following:
 - a. Zurn Industries, LLC.
2. Fixture:
 - a. Standard: IAPMO/ANSI Z124.6.
 - b. Material: Cast polymer.

- c. Nominal Size: 36 by 36 by 10 inches.
 - d. Tiling Flange: On two sides.
 - e. Rim Guard: On all top surfaces.
 - f. Color: Not applicable.
 - g. Drain: Grid with NPS 3 outlet.
3. Mounting: On floor and flush to wall.
 4. Faucet: Insert sink-faucet designation from "Sink Faucets" Article or as shown on owner requirement documents.

2.2 SERVICE SINKS

A. Service Sinks: Enameled, cast iron, trap standard mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Standard.
 - b. Zurn Industries, LLC.
2. Fixture:
 - a. Standard: ASME A112.19.1/CSA B45.2.
 - b. Type: Service sink with back.
 - c. Back: Two faucet holes.
 - d. Nominal Size: 22 by 18 inches.
 - e. Color: White.
 - f. Mounting: NPS 2 P-trap standard with grid strainer inlet, cleanout, and floor flange.
 - g. Rim Guard: On front and sides.
3. Faucet: Insert sink-faucet designation from "Sink Faucets" Article or as shown on owner requirement documents.
4. Support: Type II sink carrier.

2.3 UTILITY SINKS

A. Utility Sinks: Stainless steel, counter mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Elkay Manufacturing Co.
2. Fixture:
 - a. Standard: ASME A112.19.3/CSA B45.4.
 - b. Type: Ledge back.
 - c. Number of Compartments: As shown on plumbing plans.

3. Faucet(s): Insert sink-faucet designation from "Sink Faucets" Article or as shown on owner requirement documents.
 - a. Number Required: One.
 - b. Mounting: On ledge.

4. 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: Wheel handle.
 - 2) Risers: NPS 1/2, ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

5. Waste Fittings:
 - a. Standard: ASME A112.18.2/CSA B125.2.
 - b. Trap(s):
 - 1) Size: NPS 2.
 - 2) Material: Chrome-plated, two-piece, cast-brass trap and ground-joint swivel elbow with 0.032-inch-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-thick stainless-steel tube to wall; and stainless-steel wall flange.
 - c. Continuous Waste:
 - 1) Size: NPS 2.
 - 2) Material: Chrome-plated, 0.032-inch-thick brass tube.

6. Mounting: On counter with sealant.

2.4 HANDWASH SINKS

A. Handwash Sinks: Stainless steel, wall mounted.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Elkay Manufacturing Co.

2. Fixture:
 - a. Standards: ASME A112.19.3/CSA B45.4 and NSF/ANSI 2.
 - b. Type: Basin with radius corners, back for faucet, and support brackets.
 - c. Nominal Size: 17 by 16 by 5 inches.

3. Faucet: Insert sink-faucet designation from "Sink Faucets" Article or as shown on owner requirement documents.

4. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
5. Waste Fittings: Comply with requirements in "Waste Fittings" Article.

2.5 SINK FAUCETS

- A. NSF Standard: Comply with NSF 372 for faucet-spout materials that will be in contact with potable water.
- B. Sink Faucets: Manual type, single-control mixing valve.
 1. Commercial, Solid-Brass Faucets:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) American Standard.
 - 2) Chicago Faucets; Geberit Company.
 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: As indicated on plumbing plans.
 5. Body Material: Commercial, solid brass.
 6. Finish: Chrome plated.
 7. Maximum Flow Rate: 2.2 gpm.
 8. Handle(s): Not applicable.
 9. Mounting Type: As required.
 10. Spout Type: As indicated on plumbing plans.
 11. Vacuum Breaker: Required for hose outlet.
 12. Spout Outlet: As indicated on plumbing plans or on owner documents.

2.6 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

- A. NSF Standard: Comply with NSF 372 for faucet-spout-outlet materials that will be in contact with potable water.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. T&S Brass and Bronze Works, Inc.
- C. Description: Chrome-plated brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.7 SUPPORTS

- A. Type II Sink Carrier:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Jay R. Smith Mfg. Co.
- b. Zurn Industries, LLC.

2. Standard: ASME A112.6.1M.

2.8 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF 372 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: Wheel handle.
- F. Risers:
 - 1. NPS 1/2.
 - 2. ASME A112.18.6, braided or corrugated stainless-steel flexible hose].

2.9 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.
- C. Trap:
 - 1. Size: NPS 1-1/2.
 - 2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-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-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 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. Install supports, affixed to building substrate, for wall-hung sinks.
- C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.
- D. Set floor-mounted sinks in leveling bed of cement grout.
- E. Install water-supply piping with stop on each supply to each sink faucet.
 - 1. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 22 0523.12 "Ball Valves for Plumbing Piping" and Section 22 0523.15 "Gate Valves for Plumbing Piping."
 - 2. Install stops in locations where they can be easily reached for operation.
- F. 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 0518 "Escutcheons for Plumbing Piping."
- G. 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 9200 "Joint Sealants."
- H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 22 0719 "Plumbing Piping Insulation."

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 1116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 22 1316 "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. Provide protective covering for installed sinks and fittings.
- D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 4216.16

SECTION 23 0513 – COMMON MOTOR REQUIREMENTS FOR HVAC 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. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
- B. Related Requirements:
 - 1. Section 26 2815 "Fuses" for RK-1 versus RK-5 type fuses with HVAC units.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. 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.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Rotor: Random-wound, squirrel cage.
- F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- G. Temperature Rise: Match insulation rating.
- H. Insulation: Class F.
- I. 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.
- J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed 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. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
 2. Split phase.
 3. Capacitor start, inductor run.
 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. 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.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 0513

SECTION 23 0518 - ESCUTCHEONS FOR HVAC PIPING

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.
- 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 finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange.
- 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.
- 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.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 23 0518

SECTION 23 0529 - HANGERS AND SUPPORTS 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. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Fastener systems.
5. Equipment supports.

B. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 23 05 48 "Vibration and Seismic Controls for HVAC" for vibration isolation devices.
3. Section 23 31 13 "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: 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. Equipment supports.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.6 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 carbon steel.
- B. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated 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. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. Unistrut; Part of Atkore International.
 - d. Or 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 inturned 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 carbon steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Paint Coating: Vinyl alkyd.
9. Plastic Coating: PVC.

2.4 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated 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 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 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, 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. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. 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.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. 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.
- J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. 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.
- L. 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 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.
5. 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.

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.

- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting".
- C. 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 carbon-steel pipe hangers and supports, metal trapeze pipe hangers, and metal framing systems and attachments for general service applications.
- F. Use stainless-steel pipe hangers and corrosion-resistant attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal-hanger shield inserts for insulated piping and tubing.
- J. 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. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 3. 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.
 4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 5. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 7. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
- K. 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.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- L. 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.
- M. 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. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 6. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 7. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 8. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 9. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 10. 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.
 11. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- N. 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.
- O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

- Q. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 23 0529

SECTION 23 0548 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Open-spring isolators.
5. Housed-spring isolators.
6. Restrained-spring isolators.
7. Housed-restrained-spring isolators.
8. Pipe-riser resilient supports.
9. Resilient pipe guides.
10. Elastomeric hangers.
11. Spring hangers.
12. Snubbers.
13. Restraint channel bracings.
14. Restraint cables.
15. Seismic-restraint accessories.
16. Mechanical anchor bolts.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.

1. Include design calculations and details for selecting vibration isolators and seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- ##### A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval 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 unavailable, 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 ELASTOMERIC ISOLATION PADS

- A. Elastomeric Isolation Pads:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
 - 2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
 - 3. Size: Factory or field cut to match requirements of supported equipment.
 - 4. Pad Material: Oil and water resistant with elastomeric properties.
 - 5. Surface Pattern: Waffle pattern.
 - 6. Infused nonwoven cotton or synthetic fibers.
 - 7. Load-bearing metal plates adhered to pads.

2.2 ELASTOMERIC ISOLATION MOUNTS

- A. Double-Deflection, Elastomeric Isolation Mounts:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
 - 2. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.3 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
2. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
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 rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.5 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
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 rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top housing with elastomeric pad.

2.6 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.
 - a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top plate with elastomeric pad.
 - c. Internal leveling bolt that acts as blocking during installation.
3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.7 HOUSED-RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
 2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.8 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
 3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.9 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kinetics Noise Control, Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Isolation.
2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.10 SNUBBERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Kinetics Noise Control, Inc.
 2. Mason Industries, Inc.
- B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
 1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 3. Maximum 1/4-inch air gap, and minimum 1/4-inch-thick resilient cushion.

2.11 RESTRAINT CHANNEL BRACINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Hilti, Inc.
 2. Mason Industries, Inc.

- B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.12 RESTRAINT CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Kinetics Noise Control, Inc.
 - 2. Mason Industries, Inc.
- B. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.13 SEISMIC-RESTRAINT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Kinetics Noise Control, Inc.
 - 2. Mason Industries, Inc.
- B. Hanger-Rod Stiffener: Reinforcing steel angle clamped to hanger rod.
- C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- F. 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.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

- 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 is adequate to carry present and future static and seismic loads within specified loading limits.

3.2 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for reinforcement.
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Comply with requirements in Section 07 7200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- D. Equipment Restraints:
 - 1. Install seismic snubbers on HVAC 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 inch.
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- E. Install cables so they do not bend across edges of adjacent equipment or building structure.
- F. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- G. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- H. 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.
- I. 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.
- J. 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.

3.3 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.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will 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.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.5 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.

END OF SECTION 23 0548

SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
 2. Warning signs and labels.
 3. Pipe labels.
 4. Duct labels.
 5. Control Device

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Champion America.
 - c. emedco.
 2. Material and Thickness: Formica/Plastic, 0.125-inch minimum thickness, engraving stock beveled on both sides and having two 3/16" predrilled or stamped holes for attachment hardware.
 3. Letter Color: Red.
 4. Background Color: White.
 5. Fasteners: Stainless-steel rivets or self-tapping screws.
- B. Label Content: Equipment number and nomenclature corresponding to the information on the mechanical contract drawings.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Champion America.
 - 3. emedco.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Industry Standard.
- D. Background Color: Industry Standard.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 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-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Champion America.
 - 3. emedco.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.
- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include 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: Size letters according to ASME A13.1 for piping.

2.4 DUCT LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Brady Corporation.
 2. Champion America.
 3. emedco.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Industry Standard.
- D. Background Color: Industry Standard.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 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-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.
 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.5 CONTROL DEVICE LABELS

- A. Thermostats and Exhaust Fan switches shall have labels mounted on or just above the control device labeled with the equipment being controlled. As an example, for an exhaust fan controlled by a switch the label would read "EF-1" or if a thermostat the label would read "AC-1"
 1. Labels shall be 2"x1" x 1/8" thick Formica/plastic engraving stock beveled on both sides and with two 3/16" diameter holes near the top uppermost tag corners.
 2. Letter color: Red

3. Background Color: White
4. Fastener: Adhesive

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. Piping Color-Coding: Painting of piping is specified in Section 09 9123 "Interior Painting."
- B. Pipe Label Locations: 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:

3.4 DUCT LABEL INSTALLATION

- A. Install plastic-laminated self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 1. Blue: For supply ducts.
 2. Yellow: For return ducts.
 3. Green: For exhaust-, outside-, relief-, and mixed-air ducts.
- B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

END OF SECTION 23 0553

SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-air-volume systems.
 - 2. Balancing Hydronic Piping Systems:
 - a. Constant-flow hydronic systems.
 - b. Variable-flow hydronic systems.

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- F. TDH: Total dynamic head.

1.3 INFORMATIONAL SUBMITTALS

- A. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- B. Certified TAB reports.

1.4 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC, NEBB or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC, NEBB or TABB.
 - 2. TAB Technician: Employee of the TAB specialist and certified by AABC, NEBB or TABB as a TAB technician.

- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine 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 ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan curves.
 - 1. 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.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.

- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units and verify that they are accessible and their controls are connected and functioning.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine operating safety interlocks and controls on HVAC equipment.
- M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures for balancing the systems.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Duct systems are complete with terminals installed.
 - b. Volume, smoke, and fire dampers are open and functional.
 - c. Clean filters are installed.
 - d. Fans are operating, free of vibration, and rotating in correct direction.
 - e. Variable-frequency controllers' startup is complete and safeties are verified.
 - f. Automatic temperature-control systems are operational.
 - g. Ceilings are installed.
 - h. Windows and doors are installed.
 - i. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 23 3300 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 23 0713 "Duct Insulation."

- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 23 3113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report artificial loading of filters at the time static pressures are measured.
3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. 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 that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
 - a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.

- b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
 - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
 - d. Adjust controls so that terminal is calling for minimum airflow.
 - e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
 - f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
 - g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.
5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
 - c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
6. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report any artificial loading of filters at the time static pressures are measured.
7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
 - b. Verify that terminal units are meeting design airflow under system maximum flow.
8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
9. Verify final system conditions as follows:
 - a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
 - b. Re-measure and confirm that total airflow is within design.
 - c. Re-measure final fan operating data, rpms, volts, amps, and static profile.

- d. Mark final settings.
- e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
- f. Verify tracking between supply and return fans.

3.7 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Within plus 5 percent of design requirements.
 2. Air Outlets and Inlets: Within plus 10 percent of design requirements.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.8 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to 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; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 1. Title page.
 2. Name and address of the TAB specialist.
 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 TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.

- b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, 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. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Pipe and valve sizes and locations.
 4. Terminal units.
 5. Balancing stations.
 6. Position of balancing devices.
- E. Package Rooftop Unit Test Reports: For package rooftop unit with coils, include the following:
1. Unit Data:
 - 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. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor 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. Center-to-center dimensions of sheave and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):

- 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. Outdoor airflow in cfm.
- i. Return airflow in cfm.
- j. Outdoor-air damper position.
- k. Return-air damper position.
- l. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

- a. System identification.
- b. Location.
- c. Coil type.
- d. Number of rows.
- e. Fin spacing in fins per inch o.c.
- f. Make and model number.
- g. Face area in sq. ft..
- h. Tube size in NPS.
- i. Tube and fin materials.
- j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm.
- b. Average face velocity in fpm.
- c. Air pressure drop in inches wg.
- d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
- e. Return-air, wet- and dry-bulb temperatures in deg F.
- f. Entering-air, wet- and dry-bulb temperatures in deg F.
- g. Leaving-air, wet- and dry-bulb temperatures in deg F.
- h. Refrigerant expansion valve and refrigerant types.
- i. Refrigerant suction pressure in psig.
- j. Refrigerant suction temperature in deg F.

G. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

- 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. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:
 - a. Motor 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. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - 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, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
 - 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. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- I. Air-Terminal-Device Reports (Fan Coil Units):
1. Unit Data:
 - a. System unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft..
 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Air velocity in fpm.

- c. Preliminary airflow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final airflow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg F.

J. System-Coil Reports: For coils of terminal units, include the following:

1. Unit Data:

- a. System unit identification.
- b. Location and zone.
- c. Room or riser served.
- d. Coil make and size.

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm.
- b. Water pressure drop in feet of head or psig.
- c. Entering-air temperature in deg F.
- d. Leaving-air temperature in deg F.

K. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.9 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Architect Owner Construction Manager commissioning authority.
- B. Architect Owner Commissioning authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
3. If the second verification also fails, Owner design professional Architect may contact AABC Headquarters regarding the AABC National Performance Guaranty.

F. Prepare test and inspection reports.

3.10 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 0593

SECTION 23 0713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, concealed return located in unconditioned space.
 - 3. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 4. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
- B. Related Sections:
 - 1. Section 23 0719 "HVAC Piping Insulation."
 - 2. Section 23 3113 "Metal Ducts" for duct liners.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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 insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 - 3. Detail application of field-applied jackets.
 - 4. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. 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.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum 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 Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Manson Insulation Inc.
 - e. Owens Corning.
 - f. Manson Insulation Inc.
 - g. Owens Corning.

2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 1-hour fire rating by an NRTL acceptable to authorities having jurisdiction.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. 3M.
 - b. CertainTeed Corporation.
 - c. Johns Manville; a Berkshire Hathaway company.
 - d. Nelson Firestop; a brand of Emerson Industrial Automation.
 - e. Thermal Ceramics.
 - f. Unifrax Corporation.

2.3 ADHESIVES

- 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.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
- D. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. P.I.C. Plastics, Inc.
 - d. Speedline Corporation.

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products.
 - c. Knauf Insulation.
 - d. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Knauf Insulation.
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: White.

2.6 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.
 4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Childers Brand; H. B. Fuller Construction Products.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. Self-Adhesive Outdoor Jacket: 60-mil-thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Polyguard Products, Inc.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Knauf Insulation.
 - e. Venture Tape.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Knauf Insulation.
 - e. Venture Tape.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Knauf Insulation.
 - e. Venture Tape.
 2. Width: 2 inches.
 3. Thickness: 3.7 mils.
 4. Adhesion: 100 ounces force/inch in width.
 5. Elongation: 5 percent.

6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ITW Insulation Systems; Illinois Tool Works, Inc.
 - b. RPR Products, Inc.
- B. Insulation Pins and Hangers:
 1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) AGM Industries, Inc.
 - 2) Gemco.
 - 3) Hardcast, Inc.
 - 4) Midwest Fasteners, Inc.
 - 5) Nelson Stud Welding.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Gemco.
 - 2) Midwest Fasteners, Inc.
 - b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.

- c. Spindle: Nylon, 0.106-inch-diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
3. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) AGM Industries, Inc.
 - 2) Gemco.
 - 3) Hardcast, Inc.
 - 4) Midwest Fasteners, Inc.
 - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive-backed base with a peel-off protective cover.
4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) AGM Industries, Inc.
 - 2) Gemco.
 - 3) Hardcast, Inc.
 - 4) Midwest Fasteners, Inc.
 - 5) Nelson Stud Welding.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
5. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Gemco.
 - 2) Midwest Fasteners, Inc.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. C & F Wire.

2.11 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. 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.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- 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.
- 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-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches 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 duct 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 beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 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 below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. 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.
 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
1. Comply with requirements in Section 07 8413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 07 8413 "Penetration Firestopping."

3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, 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 either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins 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, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. 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.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. 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 section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, 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 either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins 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 pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. 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.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. 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 section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.5 FIELD-APPLIED JACKET INSTALLATION

- A. 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 laps at longitudinal seams and 3-inch-wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. 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.
- C. Where metal jackets are indicated, install with 2-inch 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 o.c. and at end joints.

3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 07 8413 "Penetration Firestopping."

3.7 FINISHES

- A. Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 9000 "Paints and Coatings".
 - 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. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Inspect ductwork, 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 one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exposed supply and outdoor air.
 - 3. Indoor, concealed return located in unconditioned space.
 - 4. Indoor, exposed return located in unconditioned space.
 - 5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
- B. Items Not Insulated:
 - 1. Fibrous-glass ducts.
 - 2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 - 3. Factory-insulated flexible ducts.
 - 4. Factory-insulated plenums and casings.
 - 5. Flexible connectors.
 - 6. Vibration-control devices.
 - 7. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 1.5-lb/cu. ft. nominal density.
- B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 1.5-lb/cu. ft. nominal density.
- C. Concealed, Outdoor-Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 1.5-lb/cu. ft. nominal density.
- D. Concealed, Exhaust-Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 1.5-lb/cu. ft. nominal density.

3.11 INDOOR, 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. Ducts and Plenums, Concealed:
 - 1. Aluminum, Smooth: 0.032 inch thick.

END OF SECTION 23 0713

SECTION 23 0719 - HVAC PIPING INSULATION

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 HVAC piping systems:
 - 1. Condensate drain piping, indoors.
 - 2. Refrigerant suction and hot-gas piping, indoors and outdoors.
- B. Related Sections:
 - 1. Section 23 0713 "Duct 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).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. 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.
- 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.
 - 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.

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 23 0529 "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.
- 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" and "Outdoor, Aboveground 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. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

2.2 ADHESIVES

- 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.
- B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. Adhesive shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations."

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
 - 1. Mastics shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations."
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 4. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 - 2. Service Temperature Range: 0 to 180 deg F.
 - 3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 - 4. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 - 2. Service Temperature Range: Minus 50 to plus 220 deg F.
 - 3. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - 4. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: 60 percent by volume and 66 percent by weight.
 - 4. Color: White.

2.4 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. Lagging adhesive shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations."
 2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 3. Service Temperature Range: 0 to plus 180 deg F.
 4. Color: White.

2.5 SEALANTS

- A. Joint Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
 2. Permanently flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 100 to plus 300 deg F.
 4. Color: White or gray.
 5. Sealants shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings."
- B. Metal Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
 2. Fire- and water-resistant, flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 4. Color: Aluminum.
 5. Sealants shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings."

2.6 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Adhesive: As recommended by jacket material manufacturer.
 2. Color: White.
 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- C. Metal Jacket:

1. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Outdoor Applications: 2.5-mil-thick polysurlyn.
 - d. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.7 TAPES

- A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 1. Width: 2 inches.
 2. Thickness: 6 mils.
 3. Adhesion: 64 ounces force/inch in width.
 4. Elongation: 500 percent.
 5. Tensile Strength: 18 lbf/inch in width.
- B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 1. Width: 2 inches.
 2. Thickness: 3.7 mils.
 3. Adhesion: 100 ounces force/inch in width.
 4. Elongation: 5 percent.
 5. Tensile Strength: 34 lbf/inch in width.

2.8 SECUREMENTS

- A. Bands:
 1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
 2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

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.
 - 3. 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. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable 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 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. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. 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.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- 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 beyond damaged areas. Adhere 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. Manholes.
 5. Handholes.
 6. 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 below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. 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.
 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. 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 8413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. 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 07 8413 "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 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.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
1. Install 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 cut sections of sheet insulation of same thickness as pipe insulation.

4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and 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.
- B. Where metal jackets are indicated, install with 2-inch 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 o.c. and at end joints.

3.8 FINISHES

- A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. 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 the Project Inspector, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations 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 INDOOR PIPING INSULATION SCHEDULE

- A. Condensate and Equipment Drain Water below 60 Deg F:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 3/4 inch thick.
- B. Refrigerant Suction and Hot-Gas Piping or Flexible Tubing:
 - 1. Pipe sizes < 1 inch: Insulation shall be the following:
 - a. Flexible Elastomeric: 0.5 inch thick with conductivity of 0.21-0.26 Btu·in./(h·ft²·°F).
 - 2. Pipe sizes 1 to 1-1/2 inch: Insulation shall be the following:
 - a. Flexible Elastomeric: 1 inch thick with conductivity of 0.21-0.26 Btu·in./(h·ft²·°F).

3.12 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 1 inch thick with conductivity of 0.21-0.26 Btu·in./(h·ft²·°F).

3.13 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed:
 - 1. None.
- D. Piping, Exposed:
 - 1. PVC: 20 mils thick.

3.14 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material.
- B. Piping, Concealed:
 - 1. None.
- C. Piping, Exposed:
 - 1. Aluminum, Stucco Embossed: 0.016 inch thick.

END OF SECTION 23 0719

SECTION 23 2300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Refrigerant pipes and fittings.
 - 2. Refrigerant piping valves and specialties.
 - 3. Refrigerants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of valve, refrigerant piping, and refrigerant piping specialty.
- B. Shop Drawings:
 - 1. Show piping size and 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.
 - 2. Show interface and spatial relationships between piping and equipment.
 - 3. Shop Drawing Scale: 1/4 inch equals 1 foot.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 300 psig.
 - 2. Suction Lines for Heat-Pump Applications: 535 psig.
 - 3. Hot-Gas and Liquid Lines: 535 psig.

2.2 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 280, Type ACR.
- 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/A5.8M.
- 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 misalignment in minimum 7-inch-long assembly.
 - 4. Working Pressure Rating: Factory test at minimum 500 psig.
 - 5. Maximum Operating Temperature: 250 deg F.

2.3 VALVES AND SPECIALTIES

- A. Diaphragm Packless Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Danfoss Inc.
 - b. Heldon Products; Henry Technologies.
 - c. Parker Hannifin Corp.
 - d. Paul Mueller Company.
 - 2. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
 - 3. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
 - 4. Operator: Rising stem and hand wheel.

5. Seat: Nylon.
 6. End Connections: Socket, union, or flanged.
 7. Working Pressure Rating: 500 psig.
 8. Maximum Operating Temperature: 275 deg F.
- B. Solenoid Valves: Comply with AHRI 760 and UL 429; listed and labeled by a National Recognized Testing Laboratory (NRTL).
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 - d. Parker Hannifin Corp.
 - e. Paul Mueller Company.
 2. Body and Bonnet: Plated steel.
 3. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 4. Seat: Polytetrafluoroethylene.
 5. End Connections: Threaded.
 6. Working Pressure Rating: 400 psig.
 7. Maximum Operating Temperature: 240 deg F.
- C. Thermostatic Expansion Valves: Comply with AHRI 750.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 - d. Paul Mueller Company.
 2. Body, Bonnet, and Seal Cap: Forged brass or steel.
 3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 4. Packing and Gaskets: Non-asbestos.
 5. Capillary and Bulb: Copper tubing filled with refrigerant charge.
 6. Suction Temperature: 40 deg F.
 7. Superheat: Adjustable.
 8. Reverse-flow option (for heat-pump applications).
 9. End Connections: Socket, flare, or threaded union.
- D. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Danfoss Inc.
 - b. Heldon Products; Henry Technologies.
 - c. Parker Hannifin Corp.

2. Body, Bonnet, and Seal Cap: Ductile iron or steel.
3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Packing and Gaskets: Non-asbestos.
5. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
6. Seat: Polytetrafluoroethylene.
7. End Connections: Socket.
8. Throttling Range: Maximum 5 psig.
9. Working Pressure Rating: 500 psig.
10. Maximum Operating Temperature: 240 deg F.

E. Moisture/Liquid Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 - d. Parker Hannifin Corp.
2. Body: Forged brass.
3. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
4. Indicator: Color coded to show moisture content in parts per million (ppm).
5. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
6. End Connections: Socket or flare.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 240 deg F.

F. Replaceable-Core Filter Dryers: Comply with AHRI 730.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Danfoss Inc.
 - b. Emerson Climate Technologies.
 - c. Heldon Products; Henry Technologies.
 - d. Parker Hannifin Corp.
2. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
3. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 240 deg F.

2.4 REFRIGERANTS

- A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Arkema Inc.
 - b. DuPont Fluorochemicals Div.
 - c. Genetron Refrigerants; Honeywell International Inc.
 - d. Mexichem Fluor Inc.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Suction Lines: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with soldered joints.
- B. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with soldered joints.
- C. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install diaphragm packless valves in suction and discharge lines of compressor.
- B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
- C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- D. Except as otherwise indicated, install diaphragm packless valves on inlet and outlet side of filter dryers.
- E. Install a full-size, three-valve bypass around filter dryers.
- F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - 1. Install valve so diaphragm case is warmer than bulb.
 - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

- H. Install safety relief valves where required by 2010 ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
- I. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- J. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for the device being protected:
 - 1. Solenoid valves.
 - 2. Thermostatic expansion valves.
 - 3. Hot-gas bypass valves.
 - 4. Compressor.
- K. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.
- L. Install receivers sized to accommodate pump-down charge.
- M. Install flexible connectors at compressors.

3.3 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. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

- K. 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 08 3113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- L. Install refrigerant piping in protective conduit where installed belowground.
- M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- N. 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.
- O. 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.
- P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- Q. Identify refrigerant piping and valves according to Section 23 0553 "Identification for HVAC Piping and Equipment."
- R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 23 0517 "Sleeves and Sleeve Seals for HVAC Piping."
- S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 0517 "Sleeves and Sleeve Seals for HVAC Piping."
- T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 23 0518 "Escutcheons for HVAC Piping."

3.4 PIPE 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. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. 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.

3.5 HANGERS AND SUPPORTS

- A. Comply with requirements for pipe hangers and supports specified in Section 23 0529 "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 long.
 2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet 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 diameters:
 1. NPS 1/2: Maximum span, 60 inches; minimum rod, 1/4 inch.
 2. NPS 5/8: Maximum span, 60 inches; minimum rod, 1/4 inch.
 3. NPS 1: Maximum span, 72 inches; minimum rod, 1/4 inch.
 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod, 3/8 inch.
 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod, 3/8 inch.
 6. NPS 2: Maximum span, 96 inches; minimum rod, 3/8 inch.
 7. NPS 2-1/2: Maximum span, 108 inches; minimum rod, 3/8 inch.
 8. NPS 3: Maximum span, 10 feet; minimum rod, 3/8 inch.
 9. NPS 4: Maximum span, 12 feet; minimum rod, 1/2 inch.
- D. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

- A. Perform the following 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 "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.

- B. Prepare test and inspection reports.

3.7 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. 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.
 4. Charge system with a new filter-dryer core in charging line.

3.8 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.

END OF SECTION 23 2300

SECTION 23 3113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.
6. Seismic-restraint devices.

B. Related Sections:

1. Section 23 0593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 23 3300 "Air Duct Accessories" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ANSI/ASHRAE 62.1.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
 - a. Luminaires.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.

B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 - 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger Than 90 inches in diameter with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: 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: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

- B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant 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."

- C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

- D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant 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."

- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.6 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. B-line, an Eaton business.
 - 2. Hilti, Inc.
 - 3. Kinetics Noise Control, Inc.
 - 4. Mason Industries, Inc.
 - 5. TOLCO.
 - 6. Unistrut; Part of Atkore International.
 - 7. Vibration & Seismic Technologies, LLC.

- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - 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. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- D. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- 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. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 23 3300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts at a minimum to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 2. Outdoor, Supply-Air Ducts: Seal Class A.
 3. Outdoor, Exhaust Ducts: Seal Class C.
 4. Outdoor, Return-Air Ducts: Seal Class C.
 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.

10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
 1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 2. Brace a change of direction longer than 12 feet.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.

- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect 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 applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 23 3300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 23 3300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.

2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components 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, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

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. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
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.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.8 START UP

- A. Air Balance: Comply with requirements in Section 23 0593 "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

- B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Heat Pumps, and Terminal Units:

- a. Pressure Class: Positive 1-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 2. Ducts Connected to Constant-Volume Air-Handling Units:
 - a. Pressure Class: Positive 3-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- C. Return Ducts:
- 1. Ducts Connected to Fan Coil Units, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- D. Exhaust Ducts:
- 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
- 1. Ducts Connected to Fan Coil Units, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 - 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

G. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.

4) Radius-to Diameter Ratio: 1.5.

- b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
- c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

H. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 23 3113

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Control dampers.
4. Flange connectors.
5. Turning vanes.
6. Duct-mounted access doors.
7. Flexible connectors.
8. Duct accessory hardware.

B. Related Requirements:

1. Section 23 3723 "HVAC Gravity Ventilators" for roof-mounted ventilator caps.
2. Section 28 4621.11 "Addressable Fire-Alarm Systems" for duct-mounted fire and smoke detectors.

1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

- ##### A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- ##### A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- ##### B. 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.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Greenheck Fan Corporation.
 - 2. Nailor Industries Inc.
 - 3. Pottorff.
 - 4. Ruskin Company.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 1000 fpm.
- D. Maximum System Pressure: 3-inch wg.
- E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded corners or mechanically attached and mounting flange.
- F. Blades: Multiple single-piece blades, end pivoted, maximum 6-inch width, 0.050-inch-thick aluminum sheet with sealed edges.
- G. Blade Action: Parallel.
- H. Blade Seals: Extruded vinyl, mechanically locked.
- I. Blade Axles:
 - 1. Material: Nonferrous metal.
 - 2. Diameter: 0.20 inch.
- J. Tie Bars and Brackets: Galvanized steel.
- K. Return Spring: Adjustable tension.
- L. Bearings: Steel ball.
- M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.
4. Chain pulls.
5. Screen Mounting: Front mounted in sleeve.
 - a. Sleeve Thickness: 20 gage minimum.
 - b. Sleeve Length: 6 inches minimum.
6. Screen Mounting: Rear mounted.
7. Screen Material: Galvanized steel.
8. Screen Type: Bird.
9. 90-degree stops.

2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - a. Aire Technologies.
 - b. American Warming and Ventilating; a Mestek Architectural Group company.
 - c. Flexmaster U.S.A., Inc.
 - d. Flex-Tek Group.
 - e. McGill AirFlow LLC.
 - f. Nailor Industries Inc.
 - g. Pottorff.
 - h. Ruskin Company.
 - i. Safe Air - Dowco Products.
 - j. Trox USA Inc.
 - k. United Enertech.
 - l. Vent Products Co., Inc.
2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames:
 - a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
6. Blade Axles: Nonferrous metal.
7. Bearings:

- a. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 8. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
 - 1. Size: 0.5-inch diameter.
 - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:
 - 1. 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.
 - 2. Include center hole to suit damper operating-rod size.
 - 3. Include elevated platform for insulated duct mounting.

2.5 CONTROL DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Greenheck Fan Corporation.
 - 2. Pottorff.
 - 3. Ruskin Company.
- B. Frames:
 - 1. Hat shaped.
 - 2. 0.094-inch-thick, galvanized sheet steel.
 - 3. Mitered and welded corners.
- C. Blades:
 - 1. Multiple blade with maximum blade width of 6 inches.
 - 2. Opposed-blade design.
 - 3. Galvanized-steel.
 - 4. 0.064 inch thick single skin or 0.0747-inch-thick dual skin.
 - 5. Blade Edging: Closed-cell neoprene.
 - 6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
- D. Blade Axles: 1/2-inch-diameter; nonferrous metal; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
- E. Bearings:
 - 1. Stainless-steel sleeve.

2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.6 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 1. CL WARD & Family Inc.
 2. Ductmate Industries, Inc.
 3. Hardcast, Inc.
 4. Nexus PDQ.
 5. Ward Industries; a brand of Hart & Cooley, Inc.
- B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.7 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 1. Aero-Dyne Sound Control Co.
 2. Ductmate Industries, Inc.
 3. Duro Dyne Inc.
 4. METALAIRE, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- E. Vane Construction: Single wall.

2.8 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
1. Aire Technologies.
 2. Ductmate Industries, Inc.
 3. Flexmaster U.S.A., Inc.
 4. Greenheck Fan Corporation.
 5. Nailor Industries Inc.
 6. Pottorff.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to Square: Continuous and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
 - d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.
- C. Pressure Relief Access Door:
1. Door and Frame Material: Galvanized sheet steel.
 2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
 3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
 4. Factory set at 3.0- to 8.0-inch wg.
 5. Doors close when pressures are within set-point range.
 6. Hinge: Continuous piano.
 7. Latches: Cam.
 8. Seal: Neoprene or foam rubber.
 9. Insulation Fill: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.9 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. 3M.
 - 2. CL WARD & Family Inc.
 - 3. Ductmate Industries, Inc.
 - 4. Flame Gard, Inc.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.
- D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.10 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. CL WARD & Family Inc.
 - 2. Ductmate Industries, Inc.
 - 3. Duro Dyne Inc.
 - 4. Elgen Manufacturing.
 - 5. Hardcast, Inc.
 - 6. JP Lamborn Co.
 - 7. Ventfabrics, Inc.
 - 8. Ward Industries; a brand of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.11 DUCT 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 of length to suit duct-insulation thickness.
- B. 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 in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 1. Install steel volume dampers in steel ducts.
 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 1. On both sides of duct coils.
 2. Upstream from duct filters.
 3. At outdoor-air intakes and mixed-air plenums.
 4. At drain pans and seals.
 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.

6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream and downstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

H. Install access doors with swing against duct static pressure.

I. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

J. Label access doors according to Section 23 0553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

K. Install flexible connectors to connect ducts to equipment.

L. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

M. Connect diffusers or light troffer boots to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

N. Connect flexible ducts to metal ducts with draw bands.

O. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION 23 3300

SECTION 23 3713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Rectangular and square ceiling diffusers.
 2. Perforated diffusers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Krueger.
 2. Nailor Industries Inc.
 3. Price Industries.
 4. Titus.
 5. Tuttle & Bailey.
- B. Devices shall be specifically designed for variable-air-volume flows.
- C. Material: Steel.
- D. Finish: Baked enamel, color selected by Architect.
- E. Face Size: 24 by 24 inches or 12 by 12 inches.
- F. Face Style: Four cone.
- G. Mounting: Surface or T-bar.
- H. Pattern: Adjustable.
- I. Dampers: Radial opposed blade.
- J. Accessories:
1. Equalizing grid.

2. Plaster ring.
3. Safety chain.
4. Wire guard.
5. Sectorizing baffles.
6. Operating rod extension.

2.2 PERFORATED DIFFUSERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Krueger.
 2. Nailor Industries Inc.
 3. Price Industries.
 4. Titus.
 5. Tuttle & Bailey.
- B. Devices shall be specifically designed for variable-air-volume flows.
- C. Material: Steel backpan and pattern controllers, with steel face.
- D. Finish: Baked enamel, color selected by Architect.
- E. Face Size: 12 by 12 inches or 24 by 24 inches.
- F. Duct Inlet: Round or Square.
- G. Face Style: Flush.
- H. Mounting: Surface or T-bar.
- I. Pattern Controller: Adjustable with louvered pattern modules at inlet.
- J. Dampers: Opposed blade.
- K. Accessories:
1. Equalizing grid.
 2. Plaster ring.
 3. Safety chain.
 4. Wire guard.
 5. Sectorizing baffles.
 6. Operating rod extension.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install diffusers level and plumb.

- 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 practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

- A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 3713.13

SECTION 23 3713.23 - REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adjustable blade face registers and grilles.
2. Fixed face registers and grilles.

B. Related Requirements:

1. Section 23 3300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 23 3713.13 "Air Diffusers" for various types of air diffusers.

1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 REGISTERS

A. Fixed Face Register:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Krueger.
 - b. Nailor Industries Inc.
 - c. Price Industries.
 - d. Titus.
 - e. Tuttle & Bailey.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Vertical spaced 3/4 inch apart.
5. Face Arrangement: Perforated core.
6. Core Construction: Integral.
7. Frame: 1-1/4 inches wide.
8. Mounting: Countersunk screw.
9. Damper Type: Adjustable opposed blade.
10. Accessory: Filter.

B. Fixed Face Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Krueger.
 - b. Nailor Industries Inc.
 - c. Price Industries.
 - d. Titus.
 - e. Tuttle & Bailey.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Vertical; spaced 3/4 inch apart.
5. Face Arrangement: Perforated core.
6. Core Construction: Integral.
7. Frame: 1-1/4 inches wide.
8. Mounting: Counter Sunk.
9. Accessory: Filter.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install registers and grilles level and plumb.
- B. Outlets and Inlets Locations: 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 practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

- A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 3713.23

SECTION 23 3723 - HVAC GRAVITY VENTILATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Louvered-penthouse ventilators.
 - 2. Roof hoods.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Ventilators shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of ventilator components, noise or metal fatigue caused by ventilator blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Seismic Performance: Ventilators, including attachments to other construction, 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."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For gravity ventilators. Include plans, elevations, sections, details, ventilator attachments to curbs, and curb attachments to roof structure.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Delegated-Design Submittal: For shop-fabricated ventilators 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 shop-fabricated ventilators.

1.4 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: For ventilators, accessories, and components, from manufacturer.

1.5 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5 or T-52.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by metal producer for required finish.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 zinc coating, mill phosphatized.
- D. Fasteners: Same basic metal and alloy as fastened metal or 300 Series stainless steel unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - 1. Use types and sizes to suit unit installation conditions.
 - 2. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
- E. Post-Installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors made from stainless-steel components, with capability to sustain without failure a load equal to 4 times the loads imposed for concrete, or 6 times the load imposed for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

- A. Factory fabricate gravity ventilators to minimize field splicing and assembly. Disassemble units to the minimum extent as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.
- B. Fabricate frames, including integral bases, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- C. Fabricate units with closely fitted joints and exposed connections accurately located and secured.
- D. Fabricate supports, anchorages, and accessories required for complete assembly.

2.3 ROOF HOODS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
 2. Loren Cook Company.
- B. Factory fabricated according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figures 6-6 and 6-7.
- C. Materials: Aluminum sheet, minimum 0.063-inch-thick base and 0.050-inch-thick hood; suitably reinforced.
- D. Roof Curbs: Galvanized-steel sheet; with 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 fit roof opening and ventilator base.
1. Configuration: mounting flange.
 2. Overall Height: 12 inches.
- E. Bird Screening: Galvanized-steel, 1/2-inch-square mesh, 0.041-inch wire.
- F. Galvanized-Steel Sheet Finish:
1. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
 2. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
 3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat and an overall minimum dry film thickness of 2 mils.
 - a. Color and Gloss: As indicated by manufacturer's designations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gravity ventilators level, plumb, and at indicated alignment with adjacent work.
- B. Secure gravity ventilators to roof curbs with cadmium-plated hardware. Use concealed anchorages where possible. Refer to Section 07 7200 "Roof Accessories."
- C. Install gravity ventilators with clearances for service and maintenance.
- D. Install perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Install concealed gaskets, flashings, joint fillers, and insulation as installation progresses. Comply with Section 07 9200 "Joint Sealants" for sealants applied during installation.
- F. Label gravity ventilators according to requirements specified in Section 23 0553 "Identification for HVAC Piping and Equipment."

- G. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
- H. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

END OF SECTION 23 3723

SECTION 23 8126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 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 Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.

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:
 - a. For Compressor: 5 year(s) from date of Substantial Completion.
 - b. For Parts: 5 year(s) from date of Substantial Completion.
 - c. For Labor: 5 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Daikin North America LLC.
 2. Mitsubishi Electric & Electronics USA, Inc.
 3. SANYO North America Corporation.

2.2 INDOOR UNITS (5 TONS OR LESS)

- A. Concealed Evaporator-Fan Components:
1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 2. Insulation: Faced, glass-fiber duct liner.
 3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
 4. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch; leak tested to 300 psig underwater; with a two-position control valve.
 5. 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.
 6. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
 7. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 0513 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
 8. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

9. Filters: Disposable.
10. Condensate Drain Pans:
 - a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
 - 2) Depth: A minimum of 2 inches deep.
 - b. Single-wall, stainless-steel sheet.
 - c. Double-wall, stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
 - d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
 - 1) Minimum Connection Size: 1-1/32".
 - e. Pan-Top Surface Coating: Asphaltic waterproofing compound.
 - f. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

B. Floor-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.
 - a. Discharge Grille: Steel with surface-mounted frame.
 - b. Insulation: Faced, glass-fiber duct liner.
 - c. Drain Pans: Galvanized steel, with connection for drain; insulated.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Fan: Direct drive, centrifugal.
4. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 0513 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
5. Air Filtration Section:
 - a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) MERV 8.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
 - b. Disposable Panel Filters:

- 1) Factory-fabricated, viscous-coated, flat-panel type.
- 2) Thickness: 1 inch.
- 3) MERV according to ASHRAE 52.2: 8.
- 4) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.
- 5) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

C. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. 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.
4. Fan: Direct drive, centrifugal.
5. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 0513 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - c. Enclosure Type: Totally enclosed, fan cooled.
 - d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
 - e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
 - f. Mount unit-mounted disconnect switches on interior of unit.
6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
7. Condensate Drain Pans:
 - a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
 - 2) Depth: A minimum of 1 inch deep.
 - b. Single-wall, stainless-steel sheet.
 - c. Double-wall, stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
 - d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
 - 1) Minimum Connection Size: NPS 1.
 - e. Pan-Top Surface Coating: Asphaltic waterproofing compound.

8. Air Filtration Section:

a. General Requirements for Air Filtration Section:

- 1) Comply with NFPA 90A.
- 2) Minimum MERV according to ASHRAE 52.2.
- 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Disposable Panel Filters:

- 1) Factory-fabricated, viscous-coated, flat-panel type.
- 2) Thickness: 1 inch.
- 3) MERV according to ASHRAE 52.2: 8.
- 4) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.
- 5) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. 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.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant: R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
- B. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
 2. 24-hour time control of system stop and start.
 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 4. Fan-speed selection including auto setting.
- C. Automatic-reset timer to prevent rapid cycling of compressor.
- D. 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.
- E. Drain Hose: For condensate.
- F. Monitoring:
1. Monitor constant and variable motor loads.
 2. Monitor variable-frequency-drive operation.
 3. Monitor economizer cycle.
 4. Monitor cooling load.
 5. Monitor air distribution static pressure and ventilation air volumes.

2.5 CAPACITIES AND CHARACTERISTICS

- A. Cooling Capacity:
1. Total: Varies Btu/h.
 2. Sensible: Varies Btu/h.
 3. SEER: See plans.
 4. EER: See plans.
 5. Entering-Air Temperature:
 - a. Dry Bulb: 95 deg F.
 - b. Wet Bulb: 75 deg F.
 6. Leaving-Air Temperature:
 - a. Dry Bulb: 55 deg F.
 - b. Wet Bulb: 53 deg F.
- B. Heating Capacity:
1. Type: Electric.
 2. Total Capacity: Varies Btu/h.
 3. Air-Temperature Rise: .
 4. Coefficient of Performance: See plans.
 5. Heating Season Performance Factor: See plans.
- C. Indoor Unit:
1. Fan Motor Electrical Characteristics:
 - a. Volts: 208 V ac.

- b. Phase: Single.
- c. Frequency: 60 Hz.

D. Outdoor Unit:

- 1. Type: Air cooled.
- 2. Electrical Characteristics:
 - a. Volts: 208.
 - b. Phase: Single.
 - c. Frequency: 60 Hz.
 - d. Minimum Circuit Ampacity: See plans.
 - e. Maximum Overcurrent Protection: See plans.
 - f. Fan Motor Full-Load Amperes: See plans.
 - g. Compressor Full-Load Amperes: See plans.
 - h. Compressor Locked-Rotor Amperes: See plans.

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-mounted, compressor-condenser components on equipment supports specified in Section 07 7200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- D. Equipment Mounting:
 - 1. Comply with requirements for vibration isolation and seismic control devices specified in Section 23 0548 "Vibration and Seismic Controls for HVAC."
- E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.
- C. Duct Connections: Duct installation requirements are specified in Section 23 3113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 23 3300 "Air Duct Accessories."

3.3 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.

B. Tests and Inspections:

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.

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

- #### A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 23 8126

SECTION 26 0100 - BASIC ELECTRICAL REQUIREMENTS

1.1 GENERAL

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.3 SUMMARY

- A. Drawings are necessarily diagrammatic by their nature and are not intended to show every connection in detail or every pipe or conduit in its exact location. Carefully investigate structural and finish conditions and coordinate the separate trades in order to avoid interference between the various phases of Work. Organize and lay out Work so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. Install all Work parallel or perpendicular to building lines unless otherwise noted.
- B. The intent of the Drawings is to establish the types of systems and functions; not to set forth each item essential to the functioning of the system. Install the Work complete, including minor details necessary to perform the function indicated. Review pertinent Drawings and adjust the Work to conditions shown. Where discrepancies occur between Drawings, Specifications, and actual field conditions, immediately notify the Project Manager for interpretations.
- C. Coordinate the actual locations of electrical equipment with building features and equipment as indicated on architectural, structural, and mechanical drawings. Review any proposed changes in electrical wiring devices or equipment location with the Project Manager.
- D. All dimensional information related to new structures shall be taken from the appropriate Drawings. All dimensional information related to existing facilities shall be taken from actual measurements made by the Contractor on the Site.

1.4 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the Contract Documents.

1.5 DEFINITIONS

- A. Concealed: Concealed areas are those areas that cannot be seen by building occupants.

- B. Exposed: Exposed areas are all areas that are exposed to view by building occupants, including inside all equipment rooms, and areas outside the building exterior envelope, exposed to the outdoors.

1.6 QUALITY ASSURANCE

- A. Regulations: Work, materials and equipment shall comply with the latest rules and regulations specified in National Fire Protection Association (NFPA), National Electrical Code (NEC) and California Electrical Code (CEC).
- B. Discrepancies: The Drawings and Specifications are intended to comply with listed codes, ordinances, regulations and standards. Where discrepancies occur, immediately notify the Project Manager in writing and ask for an interpretation. Should installed materials or workmanship fail to comply, the Contractor is responsible for correcting the improper installation at no additional cost to the Project Manager. Additionally, where sizes, capacities, or other such features are required in excess of minimum code or standards requirements, provide those specified or shown.
- C. Contractor Qualifications: An acceptable Contractor for the Work under this Division must have personnel with experience, training and skill to provide a practical working system. The Contractor shall furnish acceptable evidence of having installed not less than three systems of size and type comparable to this Project.

1.7 SUBMITTALS

- A. Product Data: Provide coordination Drawings with submittals as required.
- B. Record Documents: In addition to hard copy format, all material submitted as final record products, including approved Shop Drawings and submittals, shall be submitted to the Project Manager in its original electronic file format on compact disc or DVD. Material may be scanned into electronic file format where necessary.

1.8 DELIVERY, STORAGE AND HANDLING

- A. All equipment and materials shall be delivered to the Project Site clean and sealed for protection.
- B. Moisture: During construction, protect switchgear, transformers, motors, control equipment, and other items from insulation moisture absorption and metallic component corrosion by appropriate use of strip heaters, lamps or other suitable means. Apply protection immediately upon receiving the products and maintain continually.
- C. Damage: Take such precautions as are necessary to protect apparatus and materials from damage. Failure to protect materials is sufficient cause for rejection of the apparatus or material in question.
- D. Finish: Protect factory finish from damage during construction operations until acceptance of the Project. Restore any finishes that become stained or damaged to Project Manager's satisfaction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

- B. Equipment and control systems should match, integrate, communicate or cooperate with building's existing systems, such as power motor control centers, switchgears, and breakers.
- C. Conditions: Provide new products of manufacturers regularly engaged in production of such equipment. Provide the manufacturer's latest standard design for the type of product specified. Products shall be U.S. made. Project Manager reserves the right to approve or disapprove foreign-made products.
- D. NEC, CEC, and UL: Products shall conform to requirements of the National and California Electrical Code. Where Underwriters' Laboratories have set standards, listed products and issued labels, products used shall be listed and labeled by UL.
- E. Space Limitations: Equipment selected shall conform to the building features and shall be coordinated with all components. Do not provide equipment that will not meet arrangement and space limitations. Contractor shall submit area layouts with submitted items shown drawn to scale. Submittals will be rejected without floor plan Drawings showing submitted items.
- F. Factory Finish: Equipment shall be delivered with a hard surface, factory-applied finish so that no additional field painting is required except for touch-up.

2.2 EQUIPMENT AND DEVICE MARKING

- A. Designations: Externally mark all equipment, devices, feeders, branch circuits and similar items with nameplates with the same designations as indicated on the Contract Documents.
- B. Nameplates shall be black laminated rigid phenolic with white core. Emergency nameplates shall be red laminated phenolic with white cores. Hospital and patient care occupancies with three essential branches on emergency generator shall utilize yellow (life safety), blue (critical), and green (equipment) colors for nameplates. Yellow nameplates shall have black lettering. Nameplate minimum size shall be 1 inch high by 3 inches long with 3/16 inch high engraved white letters. Supply blank nameplates for spare units and spaces.
- C. Nameplate Fasteners: Fasten nameplates to the front of equipment only by means of stainless steel self-tapping screws. Stick-ons or adhesives are not acceptable unless the NEMA enclosure rating is compromised, then only epoxy adhesive shall be used to attach nameplates.
- D. Nameplate Information: The general naming convention shall consist of the following segments:
 1. Building name in abbreviated form where equipment is located;
 2. Building floor where electrical equipment is located;
 3. Electrical system type: NP (normal power), EP (emergency power).
 4. System voltage: H (277/408V) or L (120/208V);
 5. Individual equipment identification: A, B, C, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. Installation shall be in accordance with manufacturer's published recommendations.

- C. Cooperation with Other Trades: Cooperate with trades of adjacent, related or affected materials or operations, and with trades performing continuations of this Work in order to effect timely and accurate placing of Work and to coordinate, in proper and correct sequence, the Work of such trades.
- D. Workmanship: Work shall be performed by competent workers skilled in their trade. This installation must be complete.
- E. Setting of Equipment: Equipment must be leveled and set plumb. Sheet metal enclosures mounted against a wall must be separated from the wall not less than 1/4 inch by means of corrosion-resistant spacers or by 3 inches of air for freestanding units. Use corrosion resistant bolts, nuts and washers to anchor equipment. Provide Drawings and layout Work showing exact size and location of sleeves, openings or inserts for electrical equipment in slabs, walls, partitions and chases in sufficient time to be coordinated with Work under other divisions.
- F. Sealing of Equipment: Seal openings into equipment to prevent entrance of animals, birds and insects.
- G. Concealed Work: Conceal all electrical Work in walls, floors, chases, under floors, underground, and above ceilings except:
 - 1. Where shown or specified to be exposed. Exposed is open to view.
 - 2. Where exposure is necessary to the proper function.
 - 3. Where size of materials and equipment preclude concealment.
- H. Provide final electrical connections to equipment furnished under other divisions and by the Project Manager. Furnish detailed Shop Drawings of equipment indicating the exact number and location of rough-in points. Such final Shop Drawings may indicate adjustments in total number and exact location of rough-in points, and in equipment dimensions. Making adjustments to field conditions is considered a part of the Work required.
 - 1. Roughing-in: When roughing-in electrical branch circuits to various items of equipment, terminate at proper points as indicated on detailed equipment Shop Drawings or as directed by Project Manager. Do not rely on Drawings accompanying these Specifications for rough-in locations, only for general routing of circuiting.
 - 2. Final Connections: Provide branch circuit connections to meet service fitting requirements.
- I. All unused openings in new and existing such as but not limited to, knockouts on panels and boxes, surface wireway openings, busway openings, circuit breaker empty slots shall be covered with approved cover plates.
- J. All electrical equipment, fittings and connections installed outdoors shall be weatherproof NEMA 3 Construction Standards.

3.2 TESTING

- A. Test Conditions:
 - 1. Place circuits and equipment into service under normal conditions, collectively and separately, as may be necessary to determine satisfactory operation. Furnish all instruments, wiring, equipment and personnel required for conducting tests. Demonstrate that the equipment operates in accordance with requirements of the Contract Documents.

- B. Test Dates: Schedule final acceptance sufficiently in advance of the Contract date to permit completion of any necessary adjustment or alterations within the number of days allotted for completion of the Contract. Provide written notification to Project Manager at least fourteen (14) calendar days in advance of Functional Performance Test dates.
- C. Circuit Verification: All 120-volt single-phase circuits shall be verified to match the Drawings and panel schedules by "ringing out" each circuit in the presence of the Project Manager's representative(s).

END OF SECTION 26 0100

SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alcan Products Corporation; Alcan Cable Division.
 2. American Insulated Wire Corp.; a Leviton Company.
 3. General Cable Corporation.
 4. Senator Wire & Cable Company.
 5. Southwire Company.
- B. Copper or Aluminum Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN-THWN and XHHW.
- D. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC mineral-insulated, metal-sheathed cable and Type MI nonmetallic-sheathed cable, Type NM with ground wire.

2.2 CONNECTORS AND SPLICES

- 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:
1. AFC Cable Systems, Inc.
 2. Hubbell Power Systems, Inc.
 3. O-Z/Gedney; EGS Electrical Group LLC.
 4. 3M; Electrical Products Division.
 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper or Aluminum. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway Metal-clad cable, Type MC and Nonmetallic-sheathed cable, Type NM.

- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway Metal-clad cable, Type MC or Nonmetallic-sheathed cable, Type NM.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC Nonmetallic-sheathed cable, Type NM.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. 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.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

- A. Testing: Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
 - a. Test feeders to individual disconnect switch.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 0519

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Grounding arrangements and connections for separately derived systems.
- C. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- D. Operation and Maintenance Data: For grounding to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Bare Grounding Conductor:
 - 1. No. 4 AWG minimum, soft-drawn copper.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, **1/4 by 4 inches** in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 5/8 by 96 inches in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building.
- E. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
 - 1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
 - 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

END OF SECTION 26 0526

SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

- C. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - 3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 4. Toggle Bolts: All-steel springhead type.
 - 5. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps and single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
3. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

END OF SECTION 26 0529

SECTION 26 0533 - Raceways and Boxes for Electrical Systems

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Conduit and fittings.
 - 2. Outlet boxes.
 - 3. Weatherproof outlet boxes.
 - 4. Junction and pull boxes.
 - 5. Floor boxes and poke-through.
 - 6. Cabinets, termination cabinets.
 - 7. Gutters.
 - 8. Concrete boxes and vaults.
 - 9. Fiberglass or composite boxes and vaults.
 - 10. Hazardous Location: Sealing Fitting
- B. Related Work:
 - 1. Installation of all wire, cable, conductor, boxes/gutters, pull ropes, fiber optic cable raceway, conduit, innerduct, cable sleeve and duct as described on the plans and/or as specified here-in. This scope shall include pathways to be installed underground on site and offsite, underslab, above grade, both concealed and exposed, overhead concealed and exposed as appropriately applied. Raceways/boxes shall be installed in accordance with their intended and allowed uses and as specified here-in whichever is more restrictive. Size and capacity of all raceway/boxes shall be as specified here-in or as depicted on the drawings, but shall not be less than that required by code. Larger raceway sizes may be specified than code would permit. The specifications shall govern.
 - 2. Listed products for termination, coupling, extending, benching supports of raceways shall be used.
 - 3. Raceways/boxes described by this section shall include, but not be limited to, power for site utilities and lighting, site and building communications, controls, fire alarm, security, access control, sound systems, data system, energy management systems, power distribution, lighting, lighting controls, video, CATV, voice communications, intercom, nurse call, HVAC and other building low voltage/communications systems controls as may be required. Raceways, boxes and duct paths required for utility companies shall be installed per plans unless utility company requirements are more restrictive at which time those requirements shall take precedence.

4. Protection of and cleanliness of pathways and raceways must be assured during the construction process in order to eliminate the possibility of debris entering the conduit, duct, pathway resulting in decreased wire capacity and potential damage to installed conductors and cables.
5. Pathways are shown in a diagrammatic way and are generally accurate as to routing, however, it is the Contractor's responsibility as a means and methods process to coordinate with all other trades that require space within a building. The Contractor shall obtain approval for installation of raceways routing through structural footings, retaining walls, columns, beams, perlins, grade beams, etc.
6. It is the Contractor's responsibility to insure that all raceway and boxes systems penetrate fire assemblies and sound rated assemblies in an approved manner using the appropriate and listed products for the purpose.
7. Trenching and backfilling for all underground conduit systems installed by the Electrical Contractor shall be the responsibility of the Contractor. Conduits shall have minimum cover requirement of 36" below finish grade with the exception of site lighting conduits which may be 24" below finish grade minimum. More stringent depth requirements may be imposed by the local agency and utility company and shall be adhered to, and / or this specification or as detailed on the plans. Joint trenching may be utilized where practicable and where permitted by this specification. Concrete, native material and sand shall be used as backfill material and shall be compacted in accordance with and coordinated with the grading and site preparation requirements. Conduits shall rest in a minimum of 4" bed of sand prior to backfill and compaction. Locations of existing underground (UG) utility systems shall be determined by calling Underground Service Alert (USA) at least 48 hours prior to any excavation. Also refer to Section 26 0546.13, ELECTRIC UTILITY SYSTEMS.
8. Minimum conduit size shall be 1/2" except if plan shows or code requires larger size. Exception: Use minimum 3/4" for underslab and below grade applications outside of building exterior walls.
9. All electrical, control, communications systems shall be installed in metallic conduit system. This shall include but not be limited to all systems described in Section B.3 above, except for voice and data systems which shall be installed as described on these plans and as specified here-in but shall not be less than the recommendations of EIA/TIA standards.
10. All line voltage wiring within the building shall be installed in metallic conduit.
11. All conduit, concrete pads, underground concrete or fiberglass substructures shall be furnished and installed with the approved materials and type for the application. Provide proper traffic control during construction as well as barriers and protection of all excavations and trenching.
12. Empty or future conduits shall be properly plugged with plastic caps or inserts with a 3/8" polyethylene pull rope. Plastic or "duct" tape will not be acceptable.
13. Exterior installations: After conductors are installed, seal conduit ends to prevent entrance of foreign material using pliable duct seal, caps or waterproof expanding foam.
14. All low voltage systems including intercom, fire alarm, public address, etc. shall be in dedicated conduit systems. It shall be the contractor's responsibility to provide raceway down walls to outlet boxes and to provide sleeves across inaccessible ceiling spaces.
15. Underground conduits entering building shall have the open end of conduit within building above the elevation of the conduit outside the building such that water cannot enter building through conduit. If such a condition exists, a pull box outside of building footprint shall be installed in conduit route before conduit enters building whereby top of

- pull box is below finish floor of building and moisture may exit box before entering building.
16. No single conduit run of any type shall exceed 300 degrees of radius bend from termination box to termination box.
 17. Separate Raceway System: Provide a separate dedicated raceway system for each system installed, do not combine different systems into a raceway or cable tray system, unless otherwise noted or allowed.
 18. Spare, Future Conduits: Conduits labeled conduit only, spare, or for future use, shall be provided with a pullrope, capped at each end, labeled as spare with destination marked, and turned over to the Owner in an unused state. Contractor shall not utilize these conduits for the installation of cabling or conductors as part of this scope of work. Contractor to verify and install at no additional cost to the Owner, additional conduits as required for the installation of the systems being installed.
 19. Outlet System: Provide electrical boxes and fittings as required for a complete installation. Including but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts, covers and all other necessary components.
 20. Code Compliance: Comply with CEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to CEC 312, 314 and 366 except as noted otherwise.
 21. Outlets to be flush mounted: Maintain integrity of insulation and vapor barrier. Unless otherwise noted, flush mount all outlet boxes.
 22. Provide putty pads of proper type around outlet boxes and/or as detailed on plan to meet sound transmission restrictions and fire ratings of walls.

1.3 SUBMITTALS

- A. Provide Shop Drawings and Product Data for the Following Equipment:
 1. Conduit and fittings.
 2. Outlet boxes.
 3. Weatherproof outlet boxes.
 4. Junction and pull boxes.
 5. Floor boxes and poke-through.
 6. Cabinets, termination cabinets.
 7. Gutters.
 8. Concrete boxes and vaults.
 9. Fiberglass or composite boxes and vaults.
 10. Putty pads.
 11. Raceways
 12. Hazardous Location: Sealing Fitting

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
- B. Furnish products listed by UL or other independent and nationally recognized testing firm.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Heavy wall Rigid Non-Metallic Conduit, shall be PVC schedule 40 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.
- B. Extra heavy wall non-metallic conduit, shall be PVC schedule 80 manufactured in accordance with NEMA Standard TC-2, UL-651 and WC 1094A specifications.
- C. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.
- D. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.
- E. Electrical Non-Metallic Tubing (ENT), shall be listed to requirements of U.L. 1653, in accordance with CEC Article 362, and meet requirements of BI National Standard CAN/CSA-C22.2 No. 227.1-U.L. 1653. ENT shall be rated for 90 degrees C conductors and shall be recognized for use in 2-hour fire resistance non-load bearing and load bearing wall assemblies. ENT shall be recognized for through-penetration firestop systems as classified to meet U.L. and ICC building codes.
- F. Flexible Metal Conduit (FMC) shall be continuous wound reduced wall galvanized steel produced to UL standards.
- G. Liquid tight flexible metal conduit shall have a thermoplastic cover over a galvanized steel core containing an integral copper ground in sizes to 1 1/4" and shall be in compliance with UL standards and CEC Article 350.
- H. Surface mount raceway shall only be used where shown on the plans. The raceway and cover shall be ivory colored by Wiremold but be capable of being over-painted in the field if required. The raceway and fittings shall meet all requirements of CEC Article 386 and be U.L. listed. Raceway shall be mechanically connected to structure with backing and anchor bolts.
- I. Wire basket tray shall be 9" wide with 4" side rails unless otherwise noted. It shall be U.L. listed and use listed connectors, elbows, tees, etc. and be cut and installed using listed equipment. Material shall be zinc electroplated steel.
- J. Cable runway tray shall be 12" wide with 4" side rails unless otherwise noted. It shall be U.L. listed and use listed connectors, elbows, tees, etc. Material shall be hollow steel with gray painted finish.
- K. Manufacturers:
 - 1. Outlet Boxes: Bowers, Raco, Steel City or equal.
 - 2. Weatherproof Outlet Boxes: Bell, Red Dot, [Carlon] or equal.
 - 3. Floor Boxes: Wiremold/Walker, Hubbell, Steel City, or equal.
 - 4. Junction and Pull Boxes: Circle AW, Hoffman, Wireguard or equal.

5. Box Extension Adapter: Bell, Red Dot, [Carlton] or equal.
6. Conduit Fittings: O-Z Gedney, Thomas & Betts, or equal.
7. Vaults: Christy, Brooks, Utility Vault or equal.
8. Putty pads: 3M, Hilti, or equal.
9. Heavy wall rigid non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
10. Extra heavy wall non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
11. Galvanized Rigid Steel (GRS) conduit shall be hot dipped galvanized, zinc coated and shall comply with Underwriters Laboratories UL-6, ANSI Specification C-80.1 and Federal Specification WW-C-581E.
12. Electrical Metallic Tubing (EMT) shall be zinc coated, with a protective coating applied to the inside surface and shall comply with Underwriter Laboratories UL-797 ANSI Specification C-80.3 and Federal Specification WW-C-563A.
13. Electrical Non-Metallic Tubing (ENT), shall be listed to requirements of U.L. 1653, in accordance with CEC Article 362, and meet requirements of BI National Standard CAN/CSA-C22.2 No. 227.1-U.L. 1653. ENT shall be rated for 90 degrees C conductors and shall be recognized for use in 2-hour fire resistance non-load bearing and load bearing wall assemblies. ENT shall be recognized for through-penetration firestop systems as classified to meet U.L. and ICC building codes.
14. Flexible Metal Conduit (FMC), Alflex, American Flexible Conduit or equal.
15. Liquid tight flexible metal conduit, Anacanda (type UA), Electri-flex Liguatite or equal.
16. Surface mount raceway, Wiremold, Three Compartment Series 5500 or equal
17. Wire basket tray, B-line, GS Metals, Cablofil or equal.
18. Cable runway tray, B-line, CPI, Homaco or equal.
19. Floor Boxes, Single Gang, Walker/Wiremold 880 CS Series or approved equal.
20. Floor Boxes, Multiple Gang, Walker/Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/or water resistant device covers.
21. Masonry Boxes, outlets in concrete, Raco Series 690 or equal.
22. Floor Boxes, Poke-Thru, Hubbell PT7 Series, Walker/Wiremold RC4 Series, or approved equal unless otherwise noted.
23. Floor Boxes, Poke-Thru, Furniture Feed, Walker/Wiremold RC9 Series or approved equal.
24. Exterior In-Grade Boxes for Non-Utility Company, Precast concrete or polymer concrete, Utility Vault and Christy.
25. Hazardous Location: Sealing Fitting – Killark, Crouse-Hinds or Appleton.

2.2 OUTLET BOXES

- A. NEMA 1 gutter, junction and pull boxes shall be fabricated from code gage steel finished in grey enamel with screw cover fronts and concentric knockouts in all sides.
- B. NEMA 3R gutter, junction and pull boxes shall be fabricated from code gage galvanized steel with screw cover fronts and concentric knockouts in the bottom only. Any penetrations to the side, top or back shall be weatherproofed in an approved manner such as "MYERS" gasketed type hub or equal.
- C. Steel outlet boxes and plaster rings shall be galvanized rigid assemblies, either one piece pressed or factory welded construction containing the size and number of knockouts required. Steel outlet boxes shall be manufactured, sized and installed in accordance with CEC Article 314. Device Outlet: Installation of one or two devices at common location, minimum 4"

square, minimum 1 1/2" deep. Single or 2 gang flush device plaster ring. Raco Series 681 and 686 or equal.

- D. Luminaire Outlet: minimum 4" square with correct plaster ring depth, minimum 1 1/2" deep with 3/8" luminaire stud if required. Provide proper depth plaster ring on bracket outlets and on ceiling outlets.
- E. Multiple Devices: Three or more devices at common location. Install 1 piece gang boxes with 1 piece device plastering. Install one device per gang unless otherwise allowed.
- F. Construction: Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Boxes shall be properly secured to the structure such that they are flush with the finish surface. Boxes shall be made structurally secure by means of the proper fastening devices.
- G. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, plaster rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.3 WEATHERPROOF OUTLET BOXES

- A. Construction: Provide corrosion-resistant cast iron, with zinc finish, weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal face plate with spring-hinged waterproof cap suitably configured for each application, including face plate gasket, blank plugs and corrosion proof fasteners. Weatherproof boxes to be constructed to have smooth sides, zinc, galvanized finish.
- B. Surface mounted die cast aluminum device boxes shall be provided with screw holes to accommodate cast device covers.
- C. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner. Weatherproof boxes in wet locations as described in CEC 406.8 (B) shall be provided with a "while-in-use" cover; red dot 'CK' Series of aluminum die-cast construction, NEMA 3R, with lacquer finish.

2.4 JUNCTION AND PULL BOXES

- A. Construction: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.
- B. Location:
 - 1. Install junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.

2. Install junction boxes and pull boxes as required to facilitate the installation of conductors and limiting the accumulated angular sum of bends between boxes, cabinets and appliances to 300 degrees.
3. Locations: Junction boxes shall be located only where necessary and only in equipment rooms, closets, and accessible attic and underfloor spaces. A horizontal distance of 24" shall separate outlet boxes on opposite sides of occupancy separation walls, fire-rated walls or partitions.
4. Labeling: Junction box covers shall be marked with indelible ink indicated the circuit numbers passing through the box.

2.5 BOX EXTENSION ADAPTER

- A. Construction: Diecast aluminum.
- B. Location: Install over flush wall outlet boxes to permit flexible raceway extension from flush outlet to fixed or movable equipment.

2.6 CONDUIT FITTINGS

- A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.
- B. Steel boxes may allow for field knock-out modifications, but shall in all other ways conform to code requirements.

2.7 FLOOR BOXES - SINGLE GANG

- A. Construction: Deep cast iron fully adjustable before and after concrete pour with all required components for complete activation. Verify required components for application of service fittings, covers, monuments, and the like, attached to floor boxes.
- B. Activations:
 1. Flush: Provide brass duplex or single signal cover, hinged with set screw lock. Carpet or tile finish ring.
 2. Monuments: Provide stainless steel monuments with power receptacle or data grommet as noted.
 3. Coordinate specific application of systems as noted on Drawings.
- C. Plastic floor boxes which glue together will not be considered. Plastic mechanically assembled floor boxes may be considered with prior approval.
- D. Location: Concrete floor. Use poke-thru of same construction in non-concrete structure. Verify exact locations. Ensure flush with finish surface.
- E. Steel floor box construction will be allowed only at upper levels of buildings not at slab on grade level.

2.8 FLOOR BOXES - MULTIPLE GANG

- A. Construction: Deep cast iron, fully adjustable before and after pour. Equal to Walker/Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/or water resistant device covers. Verify color. Partition for different power or signal applications. Provide required power receptacle devices and signal grommets or receptacles as noted. Flange type shall be compatible with floor covering for either carpet or vinyl as required and shall be brass type not polycarbonate.
- B. Floor mounted boxes shall be water tight and cast iron when installed in grade level concrete slab floor, fully adjustable with interior and exterior leveling screws. Receptacle flange shall be brass with a duplex lift lid. Flange type shall be compatible with floor type. Before installation, coordinate exact location with Architect.

2.9 FLOOR BOXES - POKE-THRU

- A. Fire rated for 4 hour, dual service, flush brass cover and service fitting prewired specification grade receptacle, voice/data jacks, as specified.
- B. Furniture Feed: Fire rated per floor assembly rating, finish flange and service head assembly.

2.10 EXTERIOR IN-GRADE BOXES FOR NON-UTILITY COMPANY USE SHALL BE:

- A. Precast concrete or polymer concrete type with full bottoms and draining into gravel drywell. . Open bottom splice/pull boxes 24" x 36" and smaller shall be open bottom, with minimum 12" of gravel below for drainage.
- B. Flushmount in hardscape and 1" above grade in softscape.
- C. Provided with correct traffic type lid, i.e., full vehicular, intermediate incidental vehicular or pedestrian-rated as applicable stamped with "ELECTRIC", "LIGHTING", "COMMUNICATIONS", etc. cover identification as shown on the drawings or as applicable. All boxes or vaults located in streets, driveways, sidewalks wider than 8', and turf areas where mowing takes place shall be traffic rated.
- D. Provided with brass hold-down bolts in cover.
- E. Provided with necessary box extensions to gain proper depth.
- F. Seal all conduit in underground boxes with duct seal after conductors have been installed.

2.11 HAZARDOUS LOCATION SEALING FITTING

- A. Copper free aluminum gas seal fitting to prevent passage of gases and vapor through electrical conduit.
- B. Provide proper sealing fitting listed for the hazard classification and orientation of installation.

- C. Include a drain canal and drain plug in installations which have a probability that liquid or vapor condensation may be trapped in raceway.
- D. Splices are not allowed in sealing fitting.
- E. Install packing fiber and sealing compound per manufacturers recommendations.

2.12 IN-GRADE UTILITY COMPANY BOXES AND VAULTS

- A. In-grade boxes and pads for utility company, shall be as specified by the respective utility company with all of the company's requirements and construction methods met.

2.13 PUTTY PADS

- A. Intumescent moldable firestop putty designed to protect electrical outlet boxes.
- B. Designed to install around outside of outlet boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Conduit systems listed below are for use in installations where they are permitted to be used by CEC and/or other occupancy restrictions. The below installation methods do not intend to suggest that these materials be installed in conflict with any applicable code. Special attention to applications shall be made in building types such as Educational, Health Care, wet location, hazardous locations, assembly occupancy and multi-story, but not limited to these. Requirements which are more restrictive than the CEC may be called for by the drawings and / or these specifications. These requirements must be adhered to. The Electrical Contractor shall be responsible to use the proper conduit system for the application. Exposed conduit is not allowed below ceilings or above slab of floor, without the permission and approval of the Architect. All conduits shall be concealed except in electrical and telecommunication rooms or where shown to be surface mounted. Exposed conduit (where allowed) shall be run square and plumb with building lines in an approved manner. Support roofmount conduits, where allowed, with minimum 12" wide redwood blocks set in mastic unless otherwise detailed in roof requirements or as specified in roofing specification, by the Architect. Strap conduits to blocks with proper sized conduit straps. Spacing of support shall be a minimum as provided for in the CEC. All exposed conduit mounted below 8' above finished grade shall be strapped at a minimum of 5' spacing.
- B. Non-Metallic Rigid Conduit shall be used in concrete slabs, below concrete slabs on grade, or underground outside of a building slab or foundation. Maintain minimum depth requirements and cover with appropriate fill material. Minimum 4" of bedding and cover of backfill material 1/4" size grain and smaller maximum. Conduit shall be heavy wall Schedule 40 or 80, rigid PVC only. Rigid utility P&C duct shall not be used in any application. Properly sized grounding conductors shall be installed per CEC article 250, in all non-metallic conduit branch circuit and feeder runs. PVC conduit shall be formed or field bent only with the use of properly

approved bending tools such as to not decrease the internal bore of the conduit. All conduits shall be cut square and reamed of burrs. Approved and compatible glue shall be used on all PVC fittings to attain watertight joints. All non-metallic conduit runs over 150' in length and over 1 1/4" trade size conduit shall utilize galvanized rigid steel elbows.

- C. Galvanized Rigid Steel (GRS) conduit shall be used where exposed less than 8'-0" above finished grade to 18" below finished grade and where subject to physical damage. Conduits shall be cut square and reamed to remove burrs and sharp edges. Strap conduit below 8' above grade at 5' intervals. Unless otherwise noted, threadless setscrew and threadless weathertight fittings may be used in lieu of threaded fittings. All threaded ends entering a junction box of any type shall require one locknut on the inside and one on the outside of the enclosure and be provided with a plastic bushing or grounding bushing where necessary for proper grounding. Where exposed to moisture, a watertight hub or other approved method shall be required. All conduits shall be stubbed up straight and uniform into junction boxes, panels, cabinets, etc., and shall be (GRS) properly supported and strapped. All GRS conduit located below grade, shall be tape wrapped.
- D. Electrical Metallic Tubing (EMT) shall be used as allowed by code and as permitted by this specification. It shall not be in contact with soil or the concrete slab on the ground floor of any structure. Connectors and couplings shall be steel insulated set screw type where installed in indoor dry locations not subject to moisture. Where the potential for moisture is present, compression type weathertight fittings are required. One hole conduit straps are permitted from 1/2" to 1" and two hole conduit straps are required for size 1 1/4" and larger. EMT shall not be allowed in areas subject to severe physical damage. Install copper ground wire sized per CEC 250-122 in all EMT conduits.
- E. Electrical Non-Metallic Tubing (ENT) shall be installed in accordance with its listed application. Only listed cement shall be used for connectors, coupling, fittings requiring cement. Unless otherwise noted, ENT systems shall be color coded: Blue for branch and/or feeder power wiring, yellow for communications systems, and red for fire alarm and emergency power systems. Use only approved and listed accessories.
 - 1. Electrical Nonmetallic Tubing (ENT) is designed to replace EMT, flexible metal conduit or other raceway or cable systems, for installation in accordance with Article 362 of the National Electrical Code, Section 12-1500 of the CEC, other applicable sections of the Code, and local codes.
 - 2. Any ENT used shall be listed to the requirements of UL Standard UL 1653 in accordance with Article 362 of the NEC and Section 12-1500 of the CEC.
 - 3. Any ENT used shall meet the requirements of BI National Standard CAN/CSA-C22.2 No. 227.1-UL1653 and shall be Listed/Certified in accordance to the Electrical Codes.
 - 4. Carlon's ENT shall be installed per the technical assessment prepared by fire cause analysis for use in 1hour and 2-hour rated construction.
 - 5. Penetration of fire rated walls, floors or ceilings shall use Classified Through-Penetration Firestop Systems described in the current Underwriters Laboratories Fire Resistance Directory.
 - 6. Fittings and outlet boxes shall be designed for use with ENT shall be listed. All fittings, boxes and accessories shall be from one manufacturer.
 - 7. Only Carlon ENT Blue cement recommended specifically for use with ENT and rigid nonmetallic fittings shall be used.

8. Unless indicated differently on drawings, ENT systems shall be color coded: BLUE for branch and feeder circuit wiring, YELLOW for communications, and RED for fire alarm and emergency systems, or colors can designate different voltages.
 9. ENT, fittings, and accessories shall be manufactured by Carlon.
 10. ENT shall not be used or allowed in any application where not allowed by CEC Article 362.
- F. Flexible conduit may be used where concealed in building construction or above dropped ceilings, but shall meet the following criteria: No individual circuit path from distribution panel to last device shall exceed a cumulative length of 30' of flexible conduit from start to end. Flexible conduit shall not exceed a total directional change of 270 bending degrees in any one run between conduit terminations. Squeeze type or Jake type steel flex fittings of a grounding type are required. Flexible conduit must be supported in accordance with CEC. Where exposed to the weather, moisture, or spray down flexible conduit shall be of the liquidtight type. Fittings shall be manufactured for use with liquidtight flexible conduit. All motor connections shall be made with liquidtight flex. Flexible conduit may not be used where exposed except for last 2' of equipment connection and unless otherwise noted or approved. A copper ground wire sized per CEC 250-122 shall be installed in all flexible conduit runs. Flexible conduit may not be used exposed. Weatherproof liquid tight conduit shall not be used at roof level for equipment connections with lengths exceeding 24" nor shall it be used to circumvent a rigid conduit system in a horizontal direction. Connect recessed lighting fixtures to conduit runs with a maximum of 6' of flexible metal conduit extending from junction box to fixture. "Master" "Slave" fixtures are permitted to use manufactured flexible cable of longer dimension up to 12' between "Master" and "Slave" only and only as a U.L. listed system component.
- G. Underground conduits and transition to above grade/slab shall be as follows:
1. PVC elbows allowed if top of elbow is minimum 18" BFG or below top of slab, otherwise GRS elbows are required.
 2. GRS elbows are required if conduit run is 150' or greater.
 3. GRS risers are required from elbow below grade to equipment (device, outlet, panel, cabinet, etc.) above grade.
 4. GRS elbows/risers to be PVC coated or 10 MIL taped wrapped (1/2" lapped) to 3" above finish grade or top of slab.
- H. Conduit Supports: Conduit runs may be supported by one-hole and two-hole straps or supports as manufactured by Unistrut, Minerallac, Caddy or equals. Supports may be fastened by means of anchors, shields, beam clamps, toggle bolts, or other approved methods appropriate for the application and size of conduit. Pipe nailers (J-hooks) may only be used for 1" conduit and smaller and only in wood frame construction. Conduit support methods are subject to review by the engineer and authority having jurisdiction for adequacy. Installations deemed inadequate shall be corrected by the contractor at no cost to the Owner.
- I. Bends and offsets shall be made with approved tools for the type of conduit being utilized. Bends shall be made without kinking or destroying the smooth bore of the conduit. Parallel conduits shall be run straight and true with bends uniform and symmetrical. Minimum radii shall be per CEC 344-24.
- J. Conduit Stub-outs below grade shall be capped with plastic cap, and identified by placing a pull box marked with correctly identified utility such as "Elec", "Tel", etc. Dimension for exact

location on field record drawings. Provide lids for proper field application (i.e. traffic, incidental, pedestrian).

- K. Conduit Seals: Where below grade conduits enter structure through slab or retaining wall of building or basement, seal the inside of each conduit as follows:
 - 1. Provide damming material around conductors 3" into conduit.
 - 2. Fill 3" of conduit with 3M #2123 sealing compound.
 - 3. Wrap conductors where they exit the conduit with 3M #2229 "Scotch Seal" mastic tape. Lap tape to approximate diameter of the raceway and wrap outside of conduit opening with (minimum) one turn.
 - 4. Use conduit sealing bushings type CSB (O-Z/Gedney) or equal.
 - 5. Empty conduits shall be sealed with standard non-hardening duct seal compound and then capped to prevent entrance of moisture and gases and to meet fire resistance requirements.
 - 6. Provide cable drip loop minimum 12" high.
- L. Marker tape: Place plastic yellow marker tape at 12" below finish grade along and above buried conduits. Label tape "CAUTION: ELECTRICAL LINES BELOW" or similar wording.
- M. Conduits for high voltage (12kv) systems shall be separated from all other conduits by a minimum of 12". All power system conduits shall be separated from low voltage systems by a minimum of 12" when running parallel to each other and no less than 6" when running perpendicular to each other at conduit crossings.
- N. Medium voltage system conduits including 4,000 volt and above, shall be installed in conduit systems or duct banks that are concrete encased by a minimum of 3" of concrete. Depth of conduits shall remain as specified elsewhere in this specification or as required by the CEC.
- O. Electrical and communications systems raceways routed underground shall not occupy the same trench as plumbing utilities such as sewer, water, storm drain, gas or other wet or dry gaseous utility system. A minimum of 12" of undisturbed earth is required. Where utilities must cross in closer proximity to each other due to physical constraints, 6" minimum crossing distances are allowed, however 18" on all sides of a utility crossing must be concrete encased.
- P. Duct bank defined here-in shall be four or more conduits in a common trench, conduit spacers and saddles shall be required in all trenches where more than two conduits over 2" in diameter travel in the same trench. Proper spacing between systems as outlined above shall be required and spacers shall be located each 5' (maximum) along trench route from point to point.
- Q. Conduits, routed below footings, slabs, grade beams, columns, and other structural elements shall be installed in strict compliance with structural details and criteria shown on structural plans. Clearances below structural elements and sleeves through structural elements must be carefully planned to avoid conflict and must be approved by the structural engineer if conflict arises.
- R. All conduit or raceways passing through fire rated walls, floors, or ceilings shall be installed with a listed penetration method which protects the opening to the same rating as the assembly and is non hardening.
- S. Expansion Joints

1. Conduits 3" and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
 2. Provide conduits smaller than 3" with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5" vertical drop midway between the end. All conduit shall have a copper green grounding bonding conductor installed.
- T. Seismic Joints
1. At seismic joints, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes or approved fittings, on both sides of the joint. Connect conduits to junction boxes with sufficient slack flexible conduit such that these slack conduits are 1 1/2 times the distance between conduit ends. Flexible conduit shall have a copper green ground bonding jumper installed.
- U. Ladder tray shall be used in equipment rooms where shown on the plans. Ladder tray installations shall conform to the requirements of CEC Article 318. The contractor shall provide all mounting hardware, connectors and bracing as required and as recommended by the manufacturer for a complete system installation.
- V. Wire basket tray shall be used in all concealed spaces (above ceiling spaces, under buildings in access tunnels, below raised floors, etc.) unless otherwise noted. Wire basket tray installations shall conform to the requirements of CEC Article 318. The contractor shall provide all mounting hardware, connectors and bracing as required and as recommended by the manufacturer for a complete system installation. All cutting of wire basket tray shall be per the manufacturer's recommendation using tools designed for that purpose. Cable loading shall not exceed the listing of the system and its support.
- W. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
- X. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
- Y. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.
- Z. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.
- AA. Mount outlet boxes, unless otherwise required by ADA, or noted on drawings, the following distances above the finished floor:
1. Receptacles, Telephone, TV & Data outlets. (measured to bottom of outlet box): +15".
 2. Outlet above counter (measured to top of outlet box): +46".
 3. Control (light) Switches. (measured to top of outlet box): +48".
 4. Fire Alarm Manual Pull Stations, T-stats. (measured to top of outlet box): +48".
 5. Fire Alarm Visuals: the lower of +80" to bottom of lens, or 6" below ceiling.
 6. Other Outlets: As indicated in other sections of specifications or as detailed on drawings.

- BB. Coordinate all electrical device locations with the architectural floor plan and interior and exterior elevations to prevent mounting devices within elements that they may conflict such as cabinetry, mirrors, planters, etc.
- CC. Size outlet and junction boxes to minimum wire fill space requirements. Upsize box as required to allow ease of wire installation and device installation.
- DD. Outlet and junction boxes in fire rated walls shall be gauged and spaced so as not to exceed the maximum penetration allowed by the assembly without compromising the fire rating. If a conflict arises relative to a specific condition, the contractor shall follow the requirements of the fire authority and ask for guidance from the design team. At no time should a larger box be installed prior to resolution of conflict.

End of Section

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Underground-line warning tape.
 - 4. Warning labels and signs.
 - 5. Equipment identification labels.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.

2.4 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

2.5 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- B. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

END OF SECTION 26 0553

SECTION 26 0923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Lighting contactors.

- B. Related Requirements:

1. Division 26 Section "Wiring Devices" for wall-switch occupancy sensors, and manual light switches.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Industries, Inc.
2. Intermatic, Inc.
3. Invensys Controls.
4. Leviton Mfg. Company Inc.
5. NSi Industries LLC; TORK Products.
6. Tyco Electronics; ALR Brand.

- B. Electromechanical-Dial Time Switches: Comply with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: SPST and DPST.

3. Contact Rating: 30-A inductive or resistive, 240-V ac and 20-A ballast load, 120-/240-V ac.
4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
5. Astronomic time dial.
6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
7. Skip-a-day mode.
8. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Industries, Inc.
 2. Intermatic, Inc.
 3. NSi Industries LLC; TORK Products.
 4. Tyco Electronics; ALR Brand..
 5. Or Equal.

- B. Description: Solid state, with SPST and DPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range.
 3. Time Delay: Thirty-second minimum, to prevent false operation.
 4. Lightning Arrester: Air-gap type.
 5. Mounting: Twist lock complying with NEMA C136.10, with base.
 6. Or Equal.

2.3 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Allen-Bradley/Rockwell Automation.
 2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 3. Eaton Corporation.
 4. General Electric Company; GE Consumer & Industrial - Electrical Distribution; Total Lighting Control.
 5. Square D; a brand of Schneider Electric.
 6. Or equal.

- B. Description: Electrically operated and mechanically held, combination-type lighting contactors with nonfused disconnect, complying with NEMA ICS 2 and UL 508.
 1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).

2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

2.4 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 22 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 0923

SECTION 26 2416 - PANELBOARDS

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. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.
 - 3. Load centers.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. RFI: Radio-frequency interference.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

1.4 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.

C. Panelboard Schedules: For installation in panelboards.

D. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

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. 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. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

- a. Eaton Corporation; Cutler-Hammer Products.
- b. General Electric Co.; Electrical Distribution & Protection Div.
- c. Siemens Energy & Automation, Inc.
- d. Square D.

2.2 MANUFACTURED UNITS

A. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1.

1. Rated for environmental conditions at installed location.
2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
4. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
5. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

B. Phase and Ground Buses:

1. Material: Tin-plated aluminum.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
3. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from box.

C. Conductor Connectors: Suitable for use with conductor material.

1. Main and Neutral Lugs: Compression or Mechanical type.
2. Ground Lugs and Bus Configured Terminators: Compression type.
3. Feed-Through Lugs: Compression or Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

D. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

2.3 PANELBOARD SHORT-CIRCUIT RATING

- A. UL label indicating series-connected rating with integral or remote upstream overcurrent protective devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

2.4 DISTRIBUTION PANELBOARDS

- A. Doors: Secured with vault-type latch with tumbler lock; keyed alike. Omit for fused-switch panelboards.

- B. Main Overcurrent Protective Devices: Circuit breaker or Fused switch.

C. Branch Overcurrent Protective Devices:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in circuit breakers.
2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
3. Fused switches.

2.5 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Plug-in or Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.6 LOAD CENTERS

- A. Overcurrent Protective Devices: Plug-in circuit breaker.
- B. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- C. Install overcurrent protective devices.
- D. Install filler plates in unused spaces.
- E. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

- A. Create a directory to indicate installed circuit loads.
- B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.

- B. Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

3.5 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 26 2416

SECTION 26 2726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.
 - 3. Wall-switch.
 - 4. Communications outlets.
 - 5. Cord and plug sets.
- B. Related Sections include the following:
 - 1. Division 27 Section "Communications Horizontal Cabling" for workstation outlets.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 3. Leviton Mfg. Company Inc. (Leviton).
 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 15A and 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work:
 2. Residential grade in units.

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work.

2.4 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 15A and 20 A:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work.

2.5 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

2.6 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- D. Device Installation:
1. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 2. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 3. Connect devices to branch circuits using pigtails.
 4. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 5. Tighten unused terminal screws on the device.

6. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

END OF SECTION 26 2726

SECTION 26 3213 - ENGINE-GENERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and testing of the engine-generator system. This includes, but is not limited to: air filtration, starting system, generator controls, lubrication, fuel system, cooling system, and exhaust system.
- B. The engine-generator system shall be fully automatic and shall constitute a unified and coordinated system ready for operation.

1.2 RELATED WORK

- A. Section 26 0100, BASIC ELECTRICAL REQUIREMENTS: General electrical requirements and items common to more than one section of Division 26.
- B. Section 26 0519, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage conductors.
- C. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 3623, AUTOMATIC TRANSFER SWITCHES: Requirements for automatic transfer switches for use with engine-generators.

1.3 QUALITY ASSURANCE

- A. The supplier of the engine-generator shall be responsible for satisfactory total operation of the system and its certification. This supplier shall have had experience with three or more installations of systems of comparable size and complexity. Each of these installations shall have been in successful operation for three or more years.

1.4 SUBMITTALS

- A. In accordance with REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Shop Drawings:
 - Scaled drawings, showing plan views, side views, elevations, and cross-sections.
- C. Diagrams:
 - Control system diagrams, elementary diagrams, control sequence diagrams or tables, wiring diagrams, interconnections diagrams, illustrative diagrams, flow diagrams, and other like items.
- D. Technical Data:
 - 1. Published ratings, catalog cuts, pictures, and manufacturers' specifications for engine-generator, governor, voltage regulator, radiator, muffler, dampers, day tank, pumps, fuel tank, batteries and charger, jacket heaters, and control and supervisory equipment.

2. Description of operation.
3. Sound power level data.

E. Manuals:

1. When submitting the shop drawings, submit complete maintenance and operating manuals of the engine-generator and auxiliaries, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
2. Two weeks prior to the final inspection, submit four copies of the updated maintenance and operating manual.

1.5 STORAGE AND HANDLING

- A. Equipment shall withstand shipping and handling stresses in addition to the electrical and mechanical stresses which occur during operation of the system. Protect radiator core with wood sheet.

1.6 JOB CONDITIONS

Shall conform to the arrangements and details shown on the drawings. The dimensions, enclosures, and arrangements of the engine-generator system shall permit the operating personnel to safely and conveniently operate and maintain the system in the space designated for installation.

PART 2 - PRODUCTS

2.1 ENGINE-GENERATOR

- A. The engine-generator system shall be in accordance with NFPA, UL, NEMA and ANSI, and as specified herein. All information required by these specifications shall shown on the drawings.
- B. Provide a factory-assembled, wired (except for field connections), complete, fully automatic engine-generator system.
- C. Engine-Generator Parameter Schedule:
- Power Rating: Emergency Standby
 - Voltage: 120/208V
 - Power Factor: 0.8 lagging
 - Engine-Generator Application: stand-alone
 - Fuel: diesel
 - Maximum Speed: 1800 RPM
 - Frequency Bandwidth (steady state): + 0.25 %
 - Voltage Regulation: + 2% (maximum)

Voltage Bandwidth: + 2 % (steady state)

Frequency: 60 Hz

Phases: 3 Phase, Wye

- D. Assemble, connect, and wire the equipment at the factory so that only the external connections need to be made at the construction site.
- E. Unit shall be factory-painted with manufacturer's primer and standard finishes.
- F. Connections between components of the system shall conform to the recommendations of the manufacturer.
- G. Couplings, shafts, and other moving parts shall be enclosed and guarded. Guards shall be metal, ruggedly constructed, rigidly fastened, and readily removable for convenient servicing of the equipment without disassembling any pipes and fittings.
- H. Engine-generator shall have the following features:
 - 1. Factory-mounted on a common, rigid, welded, structural steel base.
 - 2. The isolators shall be constrained with restraints capable of withstanding static forces in any direction equal to twice the weight of the supported equipment.

2.2 ENGINE

- A. Coupled directly to a generator.
- B. Minimum four cylinders.
- C. The engine shall be able to start in a 40° F [4.5° C] () ambient temperature while using No. 2 diesel fuel oil without the use of starting aids such as glow plugs and ether injections.

2.3 GOVERNOR

- A. Isochronous, electronic type.
- B. Steady-state speed band at 60 Hz shall not exceed plus or minus one-third of 1%.
- C. While the engine is running, manual speed adjustments may be made.

2.4 LUBRICATION OIL SYSTEM

- A. Pressurized type.
- B. Positive-displacement pump driven by engine crankshaft.
- C. Full-flow strainer and full-flow or by-pass filters.
- D. Extend lube oil sump drain line out through the skid base and terminate it with a drain valve and plug.

2.5 FUEL SYSTEM

Day Tank:

- 1. Each engine-generator shall be provided with a welded steel integral day tank.

2. Each day tank shall have capacity to supply fuel to the engine for a 24-hour period at 100% rated load without being refilled, including fuel that is returned to the main fuel storage tank.

2.6 COOLING SYSTEM

- A. Liquid-cooled, closed loop, with fin-tube radiator mounted on the engine-generator,
- B. Cooling capacity shall not be less than the cooling requirements of the engine-generator and its lubricating oil while operating continuously at 110% of its specified rating.
- C. Water circulating pumps shall be the centrifugal type driven by engine. Incorporate pressure relief devices where required to prevent excessive pressure increase after the engine stops.
- D. Coolant shall be extended-life antifreeze solution, 50% ethylene glycol and 50% soft water, with corrosion inhibitor additive as recommended by the manufacturer.
- E. Fan shall be driven by multiple belts from engine shaft.
- F. Coolant hoses shall be flexible, per manufacturer's recommendation.
- G. Self-contained thermostatic-control valve shall modulate coolant flow to maintain optimum constant coolant temperature, as recommended by the engine manufacturer.

2.7 AIR INTAKE AND EXHAUST SYSTEMS

- A. Air Intake:
Provide an engine-mounted air cleaner with replaceable dry filter and dirty filter indicator.
- B. Exhaust System:
 1. Where turbo-charges are required, they shall be engine-mounted, driven by the engine gases, securely braced against vibration and adequately lubricated by the engine's filtered lubrication system.
 2. Exhaust Muffler:
Shall be critical grade type and capable of the following noise attenuation:

Octave Band Hertz (Mid Frequency)	Minimum db Attenuation (.0002 Microbar Reference)
31	5
63	10
125	27
500	37
1000	31
2000	26
4000	25
8000	26

3. Pressure drop in the complete exhaust system shall be small enough for satisfactory operation of the engine-generator while it is delivering 110% of its specified rating.
 4. Exhaust pipe size from the engine to the muffler shall be as recommended by the engine manufacturer. Pipe size from muffler to air discharge shall be two pipe sizes larger than engine exhaust pipe.
 5. Connections at the engine exhaust outlet shall be made with a flexible exhaust pipe. Provide bolted type pipe flanges welded to each end of the flexible section.
- C. Condensate drain at muffler shall be made with schedule 40 black steel pipe through a petcock.

2.8 ENGINE STARTING SYSTEM

- A. Shall start the engine at any position of the flywheel.
- B. Electric cranking motor:
1. Shall be engine-mounted.
 2. Shall crank the engine via a gear drive.
 3. Rating shall be adequate for cranking the cold engine at the voltage provided by the battery system, and at the required RPM during five consecutive starting attempts of 10 seconds cranking each at 10-second intervals, for a total of 50 seconds of actual cranking without damage (the fifth starting attempt will be manually initiated upon failure of a complete engine cranking cycle).
- C. Batteries shall be lead-acid type.
1. Each battery cell shall have minimum and maximum electrolyte level indicators and a flip-top flame arrestor vent cap.
 2. Batteries shall have connector covers for protection against external short circuits.
 3. Battery racks shall be metal with an alkali-resistant finish and thermal insulation, and secured to the floor.
- D. Battery Charger:
1. A current-limiting battery charger, conforming to UL 1236, shall be provided and shall automatically recharge the batteries. The charger shall be capable of an equalize-charging rate for recharging fully depleted batteries within 24 hours and a floating charge rate for maintaining the batteries at fully charged condition.
 2. An ammeter shall be provided to indicate charging rate. A voltmeter shall be provided to indicate charging voltage.

2.9 LUBRICATING OIL HEATERS

- A. Provide a thermostatically-controlled electric heater to automatically maintain the oil temperature within plus or minus 3° F [1.7° C] of the control temperature.

2.10 GENERATOR

- A. Synchronous, amortisseur windings, bracket-bearing, self-venting, rotating-field type connected directly to the engine.
- B. Lifting lugs designed for convenient connection to and removal from the engine.
- C. Integral poles and spider, or individual poles dove-tailed to the spider.
- D. Designed for sustained operation at 125% of the RPM specified for the engine-generator without damage.
- E. Nameplates attached to the generator and exciter shall show the manufacturer's name, equipment identification, serial number, voltage ratings, field current ratings, kW/kVA output ratings, power factor rating, time rating, temperature rise ratings, RPM ratings, full load current rating, number of phases and frequency, and date of manufacture.
- F. The grounded (neutral) conductor shall be electrically isolated from equipment ground and terminated in the same junction box as the phase conductors.

2.11 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator circuit breaker shall be molded case type. Molded case circuit breaker shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for 100 A frame size or less. Magnetic trip shall be adjustable from 3x to 10x for breakers with 600 A frame size and higher. Factory setting shall be LOW unless otherwise noted. Provide shunt trip-to-trip breaker when engine-generator is shut down by other protective devices.

2.12 CONTROLS

- A. Engine-Generator Control Cubicle – Standard manufacturer product.
 - 1. Starting and Stopping Controls.
 - 2. Engine Cranking Controls.
 - 3. Supervisory Controls.
 - 4. Automatic Voltage Regulator.

2.13 SOUND-ATTENUATED ENCLOSURE

- A. The engine-generator and related equipment shall be housed in an outdoor weatherproof enclosure.
- B. The enclosure shall be provided with a factory-installed and factory-wired panelboard, 20A 120V receptacles, and compact fluorescent light fixtures with guards and switches.
- C. Enclosure shall be weatherproof and sound-attenuated (maximum 85 dBA at 5 ft from any side, top and bottom to no more than 75 dBA when measured at 50 ft horizontally from any part of the

enclosure). Sound ratings shall be based on full load condition of engine-generator in a single unit operation condition.

- D. The enclosure shall meet the following requirements:
 - 1. Radiator exhaust outlet shall be ducted through the end of the enclosure.
 - 2. All exterior surfaces shall be factory-painted with industrial enamel.
 - 3. Unit shall have sufficient guards to prevent entrance by small animals.
 - 4. Batteries shall fit inside enclosure and alongside the engine-generator. Batteries under the generator are not acceptable.
 - 5. The muffler shall be mounted and thermally-insulated inside the enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install concrete bases of dimensions shown on the drawings.
- B. Installation of the engine-generator shall comply with manufacturer's written instructions and with NFPA 110.
- C. Mounting:
 - 1. Support the base of engine-generator on vibration isolators, each isolator bolted to the floor (pad), and the generator base bolted to isolator.
 - 2. Isolators shall be shipped loose with the engine-generator.
 - 3. All connections between the engine-generator and exterior systems, such as fuel lines, electrical connections, and engine exhaust system and air exhaust shroud, shall be flexible.
- D. Connect all components of the generator system so that they will continue to be energized during failure of the normal electrical power supply system.
- E. Install piping between engine-generator and remote components of cooling, fuel, and exhaust systems.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Provide the services of a factory-authorized, factory-trained representative of the engine-generator manufacturer to inspect field-assembled components, and equipment installation and supervise the field tests.
- B. When the complete engine-generator system has been installed and prior to the final inspection, test all components of the system in the presence of the Resident Engineer for proper operation of the individual components and the complete system and to eliminate electrical and mechanical defects.
- C. Furnish fuel oil, lubricating oil, anti-freeze liquid, water treatment, and rust-inhibitor for testing of the engine-generator.

- D. Visual Inspection: Visually verify proper installation of engine-generator and all components per manufacturer's pre-start installation checklist.
- E. Set relays per this specification. Set engine-generator circuit breaker protective functions.
- F. Field Tests:
 - 1. Perform manufacturer's after-starting checks and inspections.
 - 2. Test the engine-generator for two hours of continuous operation.
 - 3. Record test data at 30-minute intervals.
- G. Starting System Test:
 - 1. Demonstrate that the batteries and cranking motor are capable of five starting attempts of 10 seconds cranking each at 10-second intervals with the battery charger turned off.
- H. Automatic Operation Tests:

Test the engine-generator to demonstrate automatic starting, loading and unloading.

3.3 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks, settings, and tests, the contractor shall demonstrate that the engine-generator(s) and control and annunciation components are in good operating condition and properly performing the intended function.

END OF SECTION 26 3213

SECTION 26 3623 - AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation AND connection of automatic transfer switches.

1.2 RELATED WORK

- A. Section 26 0519, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- B. Section 26 0526, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personal safety and to provide a low impedance path for possible ground fault currents.
- C. Section 26 0533, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS: Raceways for power and control wiring.
- D. Section 26 3213, ENGINE-GENERATORS: Requirements for normal and emergency power generation.

1.3 QUALITY ASSURANCE

- A. Automatic transfer switches shall be products of same manufacturer.

1.4 FACTORY TESTS

- A. Automatic transfer switches shall be thoroughly tested at the factory to ensure that there are no electrical or mechanical defects.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Clearly present sufficient information to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, weights, mounting details, conduit entry provisions front view, side view, equipment and device arrangement.
 - 3. Complete nameplate data, including manufacturer's name and catalog number.

B. Manuals:

1. When submitting the shop drawings, submit companion copies of complete maintenance and operating and maintenance manuals, including technical data sheets, wiring diagrams and information, such as telephone number, fax number and web sites, for ordering replacement parts.

PART 2 - PRODUCTS

2.1 OPEN-TRANSITION AUTOMATIC TRANSFER SWITCH

A. General:

1. Comply with UL, NEMA, NEC, ANSI, IEEE, and NFPA.
2. Automatic transfer switches are to be 4-pole electrically operated, mechanically held open contact type, without integral overcurrent protection.
3. Automatic transfer switches shall be completely factory-assembled and wired such that only external circuit connections are required in the field.
4. Ratings:
 - a. Phases, voltage, ampere rating, poles, and withstand current rating shall be as shown on the drawings.
 - b. Transfer switches are to be rated for continuous duty at specified continuous current rating on 60Hz systems.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install the automatic transfer switch in accordance with the NEC, as shown on the drawings, and as recommended by the manufacturer.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. After energizing circuits, demonstrate the interlocking sequence and operational function for each automatic transfer switch.

3.3 DEMONSTRATION

- A. At the final inspection in the presence of the Owner, demonstrate that the complete auxiliary electrical power system operates properly in every respect. Coordinate this demonstration with the demonstration of the engine-generator.

END OF SECTION 26 3623

SECTION 26 5100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Interior lighting fixtures, lamps, and ballasts.
- 2. Lighting fixture supports.

- B. Related Sections:

- 1. Division 26 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, and multipole lighting relays and contactors.

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. LER: Luminaire efficacy rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 SUBMITTALS

- A. Product Data per fixture schedule.
- B. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.
- C. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product indicated on Drawings or equal.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Fluorescent Fixtures: Comply with UL 1598.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- G. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp and ballast characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
 - c. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
 - d. ANSI ballast type (M98, M57, etc.) for HID luminaires.

- e. CCT and CRI for all luminaires.

2.3 BALLASTS FOR COMPACT FLUORESCENT LAMPS

- A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:

2.4 FLUORESCENT LAMPS

- A. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours unless otherwise indicated.
- B. T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.
- C. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at three hours operation per start unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 26 5100

SECTION 28 4621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

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. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Heat detectors.
 - 5. Notification appliances.
 - 6. Remote annunciator.
 - 7. Addressable interface device.
 - 8. Digital alarm communicator transmitter.
 - 9. Radio alarm transmitter.
 - 10. Network communications.

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in Section 907.1.2 of the California Building Code (CBC) and the "Documentation" section of the "Fundamentals" chapter in NFPA 72.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. NICET-certified, fire-alarm technician; Level IV minimum.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Data: Certificates, for fire-alarm control unit, 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.

C. Field quality-control reports.

1.6 Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 01 7823 "Operation and Maintenance Data," include the following:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Record copy of site-specific software.

- g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
- h. Manufacturer's required maintenance related to system warranty requirements.
- i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:

- 1. Software operating and upgrade manuals.
- 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
- 3. Device address list.
- 4. Printout of software application and graphic screens.

1.8 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. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
 - 2. Smoke Detectors, and Heat Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
 - 3. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
 - 4. Keys and Tools: One extra set for access to locked or tamperproofed components.
 - 5. Audible and Visual Notification Appliances: One of each type installed.
 - 6. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level IV technician.
- B. Contactor Qualifications: Letter or certificate from fire alarm manufacturer stating that fire alarm contractor is an authorized distributor of specified product.
- C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

1.10 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Construction Manager's written permission.
- B. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.11 SEQUENCING AND SCHEDULING

- A. Equipment Removal: Remove existing disconnected fire-alarm equipment and wiring prior to the start of installation of new fire alarm system.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. 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.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Automatic sprinkler system water flow.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Close smoke dampers in air ducts of designated air-conditioning duct systems.
7. Record events in the system memory.
8. Indicate device in alarm on the graphic annunciator.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. User disabling of zones or individual devices.
3. Loss of communication with any panel on the network.
4. Duct smoke detector

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
2. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
3. Transmit system status to building management system (if applicable).
4. Display system status on graphic annunciator.
5. Shut down associated air handling units on smoke duct detector activation.

2.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways 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."

2.4 FIRE-ALARM CONTROL UNIT

A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 100-event history log.
2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

C. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B
2. Pathway Survivability: Level 1.
3. Install no more than 250 addressable devices on each signaling-line circuit.

D. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Sound general alarm if the alarm is verified.
4. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

- E. Notification-Appliance Circuit:
 - 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
 - 2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
 - 3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- F. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.
- G. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- H. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals shall be powered by 24-V dc source.
 - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- I. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - 1. Batteries: Sealed, lead acid
- J. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Single-action mechanism, plastic-rod or pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key- or wrench-operated switch.

2.6 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be four or two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
 - a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
 - b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
 - c. Multiple levels of detection sensitivity for each sensor.
 - d. Sensitivity levels based on time of day.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

C. Ionization Smoke Detector:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.7 HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.
 1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- D. Continuous Linear Heat-Detector System:
 1. Detector Cable: Rated detection temperature 155 deg F (68 deg C). Listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short circuit wires at the location of elevated temperature.
 2. Control Unit: Two-zone or multizone unit as indicated. Provide same system power supply, supervision, and alarm features as specified for fire-alarm control unit.

3. Signals to Fire-Alarm Control Unit: Any type of local system trouble shall be reported to fire-alarm control unit as a composite "trouble" signal. Alarms on each detection zone shall be individually reported to central fire-alarm control unit as separately identified zones.
4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.8 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
- B. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- D. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 1. Rated Light Output:
 - a. 15, 30, 75, or 110 cd (refer to the drawings).
 - b. 15/30/75/110 cd, selectable in the field.
 2. Mounting: Ceiling or Wall mounted as indicated on the drawings.
 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 4. Flashing shall be in a temporal pattern, synchronized with other units.
 5. Strobe Leads: Factory connected to screw terminals.
 6. Mounting Faceplate: Factory finished, white.

2.9 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 1. Mounting: Flush or Surface cabinet, NEMA 250, Type 1.

- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.10 ADDRESSABLE INTERFACE DEVICE

- A. General:
 - 1. Include address-setting means on the module.
 - 2. Store an internal identifying code for control panel use to identify the module type.
 - 3. Listed for controlling HVAC fan motor controllers.
- B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

2.14 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by device manufacturer.
 - 2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.

2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
1. Comply with requirements for seismic-restraint devices specified in Section 27 0548.16 "Seismic Controls for Communications Systems."
- C. Manual Fire-Alarm Boxes:
1. Install one (1) manual fire-alarm box as required by the CBC as indicated on drawings.
 2. Mount manual fire-alarm box on a background of a contrasting color.
 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level.
- D. Smoke- or Heat-Detector Spacing:
1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A or Annex B in NFPA 72.
 5. HVAC: Locate detectors not closer than 36 inches (910 mm) from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- G. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- H. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.

- J. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- K. Antenna for Radio Alarm Transmitter (where required): Mount to building structure where indicated. Use mounting arrangement and substrate connection that resists 100-mph (160-km/h) wind load with a gust factor of 1.3 without damage.

3.3 PATHWAYS

- A. Pathways shall be installed in EMT.
- B. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 08 7100 "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated HVAC duct systems.
 - 2. Magnetically held-open doors.
 - 3. Supervisory connections at valve supervisory switches.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by Architect/Engineer and authorities having jurisdiction.

- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 28 4621.11

APPENDIX A

ASBESTOS AND LEAD ABATEMENT DOCUMENTS FIRE-RESCUE AIR OPERATIONS FACILITY



Environmental Services Department
Disposal & Environmental Protection

ASBESTOS ABATEMENT SPECIFICATION

for

Montgomery Field Fire Rescue Air Operation Facility

CLEARANCE ACTIVITY

October 19, 2017

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I. GENERAL REQUIREMENTS

A. DESCRIPTION OF WORK

Scope of Work: Removal of roofing patch mastics

1. ABATEMENT CONTRACTOR shall supply all labor, transportation, material, apparatus, and equipment for the removal, and disposal of asbestos-containing materials (ACM) to be impacted as a result of this project, as identified in Appendix C of this section.
2. ABATEMENT CONTRACTOR shall be responsible for ensuring the building will not be contaminated with asbestos containing material during work and shall be responsible for any clean-up determined necessary by City of San Diego's PROJECT MONITOR.
3. Before submitting his/her bid, the ABATEMENT CONTRACTOR shall visit the project site and verify the location of the asbestos-containing materials that will be removed under the terms and conditions of the contract and this specification.
4. Abatement work shall be performed within agreed upon hours submitted prior to project start which will not include designated City holidays.
5. Before the beginning of the work related to asbestos abatement, ABATEMENT CONTRACTOR shall hold a safety construction meeting with all asbestos related supervisors, workers, and other contractors on-site that provides an overview of the accepted asbestos work plan, decontamination procedures specific to this project (decontamination procedures shall be on paper with copies for all present), and disposal plan for this project. Meeting shall include the PROJECT MONITOR and any other designated City representative.

B. CONTRACTOR USE OF THE PREMISES

1. All site rules and regulations affecting the work should be complied with while engaged in project activities. The existing building should be maintained in a safe condition throughout the asbestos abatement activities. The ABATEMENT CONTRACTOR will be responsible for adhering to all applicable building codes and fire safety requirements.
2. All public areas will be kept free of accumulated waste, materials, rubbish, and debris.

C. PROJECT COORDINATION

1. It will be the responsibility of the ABATEMENT CONTRACTOR to coordinate all site activities with the City's Asbestos & Lead Management Program's (ALMP) PROJECT MONITOR including any meetings, surveys, special reports, and site usage limitations.

D. PROJECT SUBMITTALS

The ABATEMENT CONTRACTOR shall not commence any work until approval has been given from the City. The ABATEMENT CONTRACTOR shall submit the following at least 60 days prior to commencement of any asbestos abatement activities:

1. Asbestos Abatement Work Plan:
 - a) In addition to information required in this section, Work Plan shall contain all information required under Title 8 CCR 1529. Submit a detailed job-specific plan that includes:
 - (1) The procedures proposed to comply with the requirements of this specification and all applicable regulations.
 - (2) Detailed drawings that identify the location, size, layout and details of the Work Areas, any equipment, disposal storage, restrooms, and worker decontamination facilities.
 - (3) The sequencing of abatement work and the interface of trades involved in the performance of work. Provide a time line that details each major phase of work activity and anticipated time it will occur.
 - (4) The methods to be used to assure the safety of occupants and visitors to the site.
 - (5) Detailed description of the methods to be employed to ensure asbestos is not released above background air levels.
 - (6) The method of removal to minimize asbestos dust generation in the Work Area,
 - b) Work site coordination submittals including:
 - (1) Contingency and Spill Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, or any other event that may require modification or abridgement of decontamination or Work Area isolation procedures. Include in plan specific procedures for decontamination or Work Area isolation. Plan should be specific for all types of hazardous materials or situations specific to this work site. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.
 - (2) Telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
2. Notifications:
 - a) If required by regulations, submit copies of notifications made to regulatory agencies along with a copy of certified mail receipt.
 - b) Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering Work Area,

emergency entry and exit locations, modifications to fire notification or fire-fighting equipment, and other information needed by agencies providing emergency services.

c) Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this contract or the Contract Sum.

d) Provide submittal identifying person responsible for responding to project site emergencies twenty-four hours a day, seven days a week.

3. ABATEMENT CONTRACTOR qualifications and personnel information submittals that include but are not limited to:

a) Submit a copy of the ABATEMENT CONTRACTOR's Asbestos DOSH Handling License.

b) Identify state licensed transporter, disposal location, and associated permits for all asbestos waste.

c) Provide all staff names, certifications, and experience. Identify their duties and responsibilities on this project. ABATEMENT CONTRACTOR shall have the following minimum levels of qualified supervision on the project site:

(1) General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the ABATEMENT CONTRACTOR's representative responsible for compliance with all applicable federal, state and local regulations and guidelines, particularly those relating to asbestos abatement and hazardous waste. Should, in the opinion of the OWNER, any language barrier exist between the on-site superintendent and the OWNER or PROJECT MONITOR, the ABATEMENT CONTRACTOR shall employ a qualified full-time interpreter or provide a new on-site superintendent at no additional cost to the OWNER. Shall be AHERA certified as asbestos supervisor.

(2) Foreman: Provide a full time Foreman to directly supervise and direct no more than 10 abatement workers. Each Foreman will act as the Competent Person as required by Title 8 CCR 1529 for the workers the foreman is directing. The Foreman has oversight authority over the workers and reports to the General Superintendent. If there are 10 or fewer abatement workers on the project the General Superintendent may fill the Foreman's position. Shall be AHERA certified as asbestos supervisor.

(3) Experience and Training: The General Superintendent and foreman shall meet all the requirements as a Competent Person as required by Title 8 CCR 1529. They shall have completed training in

EPA Asbestos Supervisor Training. They shall have experience with projects of similar types and sizes.

(4) Workers: All asbestos abatement workers shall have current EPA and OSHA asbestos abatement training.

(5) Certificate of Worker's Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found in Appendix A of this section, for each worker and supervisor who is to be at the job site or enter the Work Area.

d) Submit respiratory protection information and air monitoring data as per the following:

(1) Operating Instruction: Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.

(2) Respiratory Protection Program: Submit ABATEMENT CONTRACTOR's written respiratory protection program manual as required by Title 8 CCR 1529 and 5144.

(3) Respiratory Protection Schedule: Submit level of respiratory protection intended for each operation required by the project.

(4) Copies of current respirator fit test: Fit tests must be performed every 6 months.

e) Submit doctor's report from medical examination conducted within the last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, the following for each worker:

(1) Name and Social Security Number

(2) Physicians Written Opinion from examining physician including at a minimum the following:

(a) Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to asbestos. Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.

(b) Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.

f) Submit a notarized certification, signed by an officer of the ABATEMENT CONTRACTOR firm that exposure measurements, medical surveillance, and worker training records are being kept in conformance with Title 8 CCR 1529.

- g) Identify the laboratory that will be performing the analysis of the personal samples and provide their accreditation. Also discuss the method by which the ABATEMENT CONTRACTOR will provide the analytical results to the PROJECT MONITOR within 24 hours of sampling completion.
- 4. Submit the following during and at the completion of the work
 - a) Copies of all Waste Shipment Records
 - b) Copies of all air monitoring results within 24 hours
- 5. At the end of a project, the ABATEMENT CONTRACTOR shall submit the following to the PROJECT MONITOR:
 - a) Personal Air Sample Results
 - b) Copies of Project Daily Logs
 - c) Containment Entry/Exit Logs
 - d) Waste Disposal Documentation
 - e) Certificate of Visual Inspection

E. SCHEDULES AND REPORTS

- 1. Prior to each phase of project, the ABATEMENT CONTRACTOR shall provide the City with a tentative time line which outlines the project schedule. These documents will be reviewed and approved by the City prior to the commencement of work.

F. PRODUCT DATA

- 1. The ABATEMENT CONTRACTOR shall submit product information that is to be used during the abatement activities prior to commencement of work (i.e., encapsulants). General information required includes manufacturer's standard printed recommendations for application and use, compliance with recognized standards of trade association and testing agencies, and safety data sheets (SDSs).
- 2. Polyethylene sheet
 - a) A single polyethylene film in the largest sheet size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and clear, frosted, or black as indicated.
 - b) Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and frosted or black as indicated.
 - c) Reinforced Polyethylene Sheet: Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles

and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, frosted or black as indicated.

3. Tape
 - a) Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
4. Spray adhesive
 - a) Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

G. PROJECT CLOSE-OUT

1. Upon completion of work and prior to payment, the PROJECT MONITOR will proceed with an initial inspection of the abatement work area. A Certificate of Visual Inspection (Appendix B) will be signed by both the ABATEMENT CONTRACTOR and PROJECT MONITOR. The ABATEMENT CONTRACTOR will not be paid until the area meets the established project-specific clearance criteria and has submitted the required information.

II. DEFINITIONS

- A. ABATEMENT: Any set of measures designed to permanently eliminate lead based paint hazards including paint removal, building component removal, or near-permanent enclosure of lead based paint hazards.
- B. ABATEMENT CONTRACTOR: The designated sub-contractor performing the required abatement work outlined in this specification.
- C. ACCREDITED or ACCREDITATION (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).
- D. AIR MONITORING: The process of measuring the fiber content of a specific volume of air.
- E. AMENDED WATER: Water to which a surfactant has been added to decrease the surface tension to 35 or less dynes.
- F. ASBESTOS: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite grunerite, anthophyllite, and actinolite tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
- G. ASBESTOS CONTAINING MATERIAL (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.

- H. ASBESTOS-CONTAINING BUILDING MATERIAL (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.
- I. ASBESTOS CONTAINING WASTE MATERIAL: Any material which is or is suspected of being or any material contaminated with an asbestos containing material which is to be removed from a work area for disposal.
- J. ASBESTOS DEBRIS: Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.
- K. AUTHORIZED VISITOR: The Owner, the Owner's Representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
- L. BARRIER: Any surface that seals off the work area to inhibit the movement of fibers.
- M. BREATHING ZONE: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- N. DEMOLITION: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- O. DISPOSAL BAG: A properly labeled 6 mil thick leak tight plastic bags used for transporting asbestos waste from work and to disposal site.
- P. ENCAPSULANT: A penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos containing materials rather than for in situ encapsulation.
- Q. ENCAPSULATION: Treatment of asbestos containing materials, with an encapsulant.
- R. ENCLOSURE: The construction of an air tight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.
- S. FILTER: A media component used in respirators to remove solid or liquid particles from the inspired air.
- T. FRIABLE ASBESTOS MATERIAL: Material that contains more than 1.0% asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. A material can also be rendered friable via mechanical means.
- U. HEPA FILTER: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.

- V. HEPA FILTER VACUUM COLLECTION EQUIPMENT (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.
- W. NEGATIVE PRESSURE RESPIRATOR: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- X. PERSONAL MONITORING: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
- Y. PROTECTION FACTOR: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- Z. PROJECT MONITOR: City of San Diego Asbestos & Lead Management Program staff or their designated consultant.
- AA. VISIBLE EMISSIONS: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- BB. WET CLEANING: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.
- CC. WORK AREA: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by Title 8 CCR 1529

III. SITE WORK

- A. INTRODUCTION
This portion of the specification describes procedures and protocols for asbestos abatement activities. The protocols/procedures described hereafter are in accordance with federal/state/local requirements. In the absence of these requirements, the procedure/protocols are based on current industry standards.

B. BACKGROUND INFORMATION

Sampling of building materials has been performed by inspectors from the City's Asbestos and Lead Management Program (ALMP) and has been provided in Appendix C of this specification.

C. GENERAL INFORMATION

1. Potential Asbestos Hazard

The disturbance of asbestos containing materials may cause exposure to workers and building occupants. All workers, supervisory personnel, subcontractors, and consultants who will be at the job site, need to be apprised of the seriousness of the hazard and of proper work practices which must be followed to minimize exposure. The procedures and methods described herein must be followed and the ABATEMENT CONTRACTOR must comply with all applicable federal/state/local requirements.

2. Stop Work

If the PROJECT MONITOR presents a verbal or written stop work order, the ABATEMENT CONTRACTOR shall immediately and automatically stop all work. Recommencement of the work may not begin until authorized by the PROJECT MONITOR.

D. PROJECT ADMINISTRATION

1. Certified Supervisor

The ABATEMENT CONTRACTOR needs to provide a full-time asbestos abatement supervisor who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This supervisor must have completed an "Asbestos Abatement Supervision" course. This person will act as the competent person on the job.

In addition, all employees working on the project must have taken an "Asbestos Abatement Worker" course.

E. SPECIAL REPORTS

1. Reporting Unusual Events

When an event of unusual and significant nature occurs at the site (e.g., a spill of asbestos debris, failure of special equipment used to contain asbestos), the ABATEMENT CONTRACTOR shall prepare and submit a special report listing the chain of events, persons participating, response by ABATEMENT CONTRACTOR's personnel, evaluation of results, and other pertinent information.

2. Reporting Accidents

The ABATEMENT CONTRACTOR shall prepare and submit reports of significant accidents at the subject site. Pertinent data and actions need to be recorded. In addition, response actions should comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury or property

loss of substance is sustained, or where the event posed a significant threat of loss or personal injury or potential environmental contamination.

F. COMPLIANCE WITH CODES AND REGULATIONS

1. Except to the extent that more explicit, or more stringent requirements are written directly into this Asbestos Abatement Contract/Specification, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

2. The ABATEMENT CONTRACTOR will assume full responsibility and liability for the compliance with all applicable federal/state/local regulations pertaining to work practices, protection of workers, and visitors to the site, persons occupying areas adjacent to the site, hauling, and disposal of waste. The ABATEMENT CONTRACTOR shall hold the City and its representative harmless for the ABATEMENT CONTRACTOR's failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of itself, its employees, or its sub ABATEMENT CONTRACTORS.

3. State requirements which govern asbestos abatement activities or hauling and disposal of hazardous waste include, but are not limited to, the following:

a) As required, ABATEMENT CONTRACTOR shall notify all Local, State, and Federal agencies regulating standards for the removal of asbestos-containing materials, including but not limited to: Cal-OSHA, San Diego Air Pollution Control District, and U.S. Environmental Protection Agency. ABATEMENT CONTRACTOR shall provide Owner a copy of each notification and a copy of a certified mail receipt proving proper notification to all required agencies.

b) ABATEMENT CONTRACTOR shall be registered as an asbestos contractor before performing any asbestos related work; a licensee must also be registered with the Department of Industrial Relations, Division of Occupational Safety and Health.

c) Transportation of hazardous materials shall be in accordance with the State of California Title 22 and the Department of Transportation regulations.

d) ABATEMENT CONTRACTOR shall comply with all provisions of California Title 8, Section 5208 and Section 1529.

e) ABATEMENT CONTRACTOR shall be in compliance with all provisions of Title 40 CFR Part 61.

f) ABATEMENT CONTRACTOR shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to site, and persons occupying areas adjacent to the site.

G. PERMITS AND LICENSES

The ABATEMENT CONTRACTOR shall submit to the City in the bid submittal any permits or licenses necessary to carry out this work.

1. Permits

A valid Hazardous Waste Hauler registration is required for transporting any hazardous waste. Certain types of equipment require APCD permits (e.g., abrasive blasters).

2. Licenses

The ABATEMENT CONTRACTOR must be certified by the California Contractors State License Board. The ABATEMENT CONTRACTOR, or its subcontractor, shall have current licenses, as required by all applicable state or local jurisdictions for the removal, transportation, disposal, or other regulated activity relative to the work described in this plan.

H. HEALTH AND SAFETY

This section describes the equipment and procedures required for protecting workers from asbestos contamination and other workplace hazards.

1. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work.

2. Training

a) All workers are to be trained, certified and accredited as required by state or local code or regulation.

b) Train all workers, in accordance with Title 8 CCR section 5208 and section 1529, regarding the dangers inherent in handling asbestos and breathing asbestos dust, proper work procedures, and personal and area protective measures.

c) Provide medical examinations for all workers who may encounter an airborne fiber level of 0.1 fibers/cc or greater for an 8 hour Time Weighted Average. In the absence of specific airborne fiber data, provide medical examinations for all workers who will enter the Work Area for any reason. Examination shall as a minimum meet requirements as set forth in Title 8 CCR 1529. In addition, provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.

3. Protective clothing

a) Coveralls: Provide disposable "full body" coveralls and disposable head covers, and require that they be worn at all times by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

b) Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with asbestos-containing material.

Thoroughly clean, decontaminate and bag boots before removing them from Work Area at the end of the work.

c) Hard Hats: Provide head protection (hard hats) as required by OSHA for all workers, and provide 1 spare for use by Owner's Representative, Project Administrator, and Owner. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of the type with plastic strap suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

d) Goggles: Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

e) Gloves: Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

4. Respirators

a) Air Purifying Respirators

(1) Respirator Bodies: Provide half face or full face type respirators based upon appropriate protection factor as determined by the ABATEMENT CONTRACTORS competent person. .

(2) Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

(3) Non permitted respirators: Do not use single use, disposable or quarter face respirators.

(4) Require that respiratory protection be used at all times when there is any possibility of disturbance of asbestos containing materials whether intentional or accidental.

(5) Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re occupancy.

(6) Regardless of Airborne Fiber Levels: Require that the minimum level of respiratory protection used be a half-face air purifying respirators with high efficiency filters.

b) Fit testing

- (1) Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection course of training. Only allow an individual to use respirators for which training and fit testing has been provided.
 - (2) Upon Each Wearing: Require that each time an air purifying respirator is put on it be checked for fit with a positive and negative pressure fit check in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).
 - c) Respirators, disposable coveralls, head covers, and foot covers shall be provided by the ABATEMENT CONTRACTOR for the City of San Diego's Asbestos and Lead Management Program's PROJECT MONITOR, and other authorized representatives who may inspect the job site. Provide two (2) respirators and six (6) complete coveralls and, where applicable, six (6) respirator filter changes per day.
5. Materials and Equipment
 - a) Only material and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards, may be used.
 6. Water Service
 - a) The ABATEMENT CONTRACTOR will be able to obtain water services from on-site facilities. The City will designate the facilities from which water service may be obtained.
 7. Electrical Services
 - a) The ABATEMENT CONTRACTOR will be able to obtain electrical services from on-site facilities. The City will designate the facilities from which electrical services may be obtained. The ABATEMENT CONTRACTOR shall provide their own electrical hook-ups, i.e. spider boxes, ground fault circuit interrupter (GFCI) etc. and installed by a licensed electrician.
 - b) The electrical services need to comply with the applicable NEMA, NECA, and UL standards, and governing regulations for materials and lay-out of temporary electrical services.
 8. Sanitary Facilities
 - a) The ABATEMENT CONTRACTOR shall provide sanitary facilities on site, if none have been made available by the City.
 9. Fire Extinguisher
 - a) Applicable recommendations of the National Fire Protection Association (NFPA) Standard 10, "Standard for Portable Fire Extinguishers," must be complied with by the ABATEMENT CONTRACTOR. Fire extinguishers need to be located where they are most convenient and effective for their intended purpose, but not less than one (1) extinguisher in each work area, the equipment room, outside/work areas, and in the clean room.
 10. First Aid

a) The ABATEMENT CONTRACTOR will need to provide first aid supplies which should comply with the governing regulations and recognized recommendations within the construction industry.

I. WORK AREA PROCEDURES

1. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area.
2. ABATEMENT CONTRACTOR shall secure work area from access by public, staff or users of the area. Accomplish this where possible, by locking doors, gates, or other means of access to the area.
3. Barricade fencing is required for securing an outside area from unauthorized access. Work area delineation shall occur at no less than twelve feet (12') from the radius of the work and/or building. Yellow caution tape shall not be used.
4. All windows, vents, mechanical systems, etc., in close proximity to the abatement area shall be sealed with plastic and tape by the ABATEMENT CONTRACTOR prior to the work beginning.
5. Provide warning signs at entry to work area in accordance with California Title 8, Section 1529.
6. A visitor entry and exit-log, and an employee daily sign-in log shall be maintained throughout the asbestos abatement activities. The ABATEMENT CONTRACTOR shall be responsible for the project site security during the operations in order to protect work efforts and equipment.

J. REMOVAL OF ASBESTOS-CONTAINING MATERIALS

1. Asbestos-containing materials shall be adequately wetted with either amended water or a removal encapsulant before and during removal process, to reduce fiber emission.
2. The ABATEMENT CONTRACTOR should exercise caution in using water, as he will be solely responsible for any water damage to the facility resulting from the work.
3. ABATEMENT CONTRACTOR is responsible for keeping all asbestos containing debris within the containment area at all times throughout removal. Any interior contamination, if created, is the responsibility of the ABATEMENT CONTRACTOR to clean at no additional cost to the City.
4. ABATEMENT CONTRACTOR shall ensure there is no loose debris around the Work Area during the removal and if found, ABATEMENT CONTRACTOR shall clean the area immediately.

K. DISPOSAL

1. Both non-friable and friable ACM shall be containerized immediately, secured in a locked container, be transported by state licensed hauler with manifest, and disposed of at appropriate landfill location.

2. The PROJECT MONITOR or designated representative will inspect each load and sign all waste manifests before waste leaves the site.
3. Copies of Waste Shipment Records for each load of asbestos waste material shall be given to the City.
4. Cordon off the Work Area, a safe zone around the building, and the dumpster area with barrier fencing. Yellow caution tape shall not be used.
5. Provide warning signs at Work Area access in accordance with Title 8 CCR 1529

L. DECONTAMINATION PROCEDURE

1. Prior to leaving the Work Area, HEPA vacuum outer suit completely and remove, turning it inside out while doing so.
2. Hygiene facilities such as change rooms and showers are not required to be adjacent to the operations on top of Work Areas on top of a roof, but these facilities must be provided [Title 8, Section 1529 (1)(3)]. Proceed to decontamination area where the second suit is to be removed while turning it inside out.
3. After wiping all areas and respirator, remove respirator and wipe facial area clean.
4. Place contaminated suits, towels, and respirator cartridges in a properly labeled asbestos waste bag.
5. At the completion of the project, boots, hard hats, and goggles should be decontaminated and bagged prior to removal from the Work Area.
6. Equipment leaving the Work Area should be HEPA vacuumed and wet wiped.

M. AIR MONITORING/WORK AREA CLEARANCE

1. The City's PROJECT MONITOR will provide ambient area air monitoring during all phases of the removal of asbestos-containing materials, including the interior and/or exterior of the facility.
2. During the project, personal air monitoring will be conducted by ABATEMENT CONTRACTOR to determine fiber levels. If fiber levels exceed 0.05 fibers/cc then work shall cease and not begin again until after PROJECT MONITOR approves the ABATEMENT CONTRACTOR's revised methodology which will lower fiber levels. Procedures shall be submitted in writing to the City prior to implementing these procedures. At a minimum, ABATEMENT CONTRACTOR shall provide air monitoring for every four workers. Testing of air samples will be by Phase Contrast Microscopy following NIOSH 7400 rules.
3. If any of the ambient area samples taken by the PROJECT MONITOR either inside or outside exceed .01 fibers/cc then ABATEMENT CONTRACTOR is required to pay for the additional testing on those samples collected using transmission electron microscopy (TEM).
4. Release of the ABATEMENT CONTRACTOR from the asbestos-containing material removal phase of the contract will be determined by the PROJECT MONITOR based upon the results of visual inspection and/or clearance air sampling.

N. TRANSPORTATION AND DISPOSAL

1. Any packaging used to ship hazardous waste off site such as a container, roll-off bin, tank or other device, must comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with Title 22 CCR Article 3. The hazardous waste label must be affixed and filled out when the first amount of hazardous waste is placed in the container. The label must include the initial accumulation date.
2. All additional pre-transportation labeling, marking or placarding must be conducted prior to transporting off site and in accordance with Title 22 CCR Chapter 12, Article 3.
3. All containers and tanks of hazardous waste must be managed in a way which minimizes the threat of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil or surface water which could threaten human health or the environment. Management techniques include containment areas capable of holding the contents of largest container within the containment area. Properly store and secure waste at all times. Do not leave hazardous waste in uncovered or unlocked trucks or dumpsters.
4. A hazardous waste manifest will be completed in accordance with Title 22 CCR Chapter 12, Article 2 for each shipment of hazardous waste leaving the work site. All waste shall leave the project site by the end of the project. Only The PROJECT MONITOR shall sign as the generator on manifests.

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APPENDIX A

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

CONTRACTOR'S NAME: _____

Working with asbestos can be dangerous. Inhaling asbestos fibers has been linked with various types of cancer. If you smoke and inhale asbestos fibers the chance that you will develop lung cancer is greater than that of the non-smoking public.

Your employer's contract with the City for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. The topics covered in the course must have included the following:

- Physical characteristics of asbestos
- Health hazards associated with asbestos
- Respiratory protection
- Use of protective equipment
- Pressure Differential Systems
- Work practices including hands on or on job training
- Personal decontamination procedures
- Air monitoring, personal and area

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x ray.

By signing this document you are acknowledging only that the City has advised you of your rights to training and protection relative to your employer, the ABATEMENT CONTRACTOR.

Signature: _____ Social Security No.: _____

Printed Name: _____

Witness (print): _____ Witness Signature: _____

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APPENDIX B
CERTIFICATION OF VISUAL INSPECTION

Project # _____ Date: _____ Location: _____

Contractor: _____

The contractor hereby certifies that he/she has visually inspected the Work Area (all surfaces including pipes, counters, ledges, walls, ceiling and floor, behind critical barriers, sheet plastic, etc.) and has found no dust, debris or residue.

By: (Signature): _____ Date: _____

(Print Name): _____

(Company Name): _____

(Print Title): _____

CITY ALMP REPRESENTATIVE

The City ALMP Representative hereby certifies that he has accompanied the contractor on his/her visual inspection and verifies that this inspection has been thorough and to the best of his/her knowledge and belief, the contractor's certification above is a true and honest one.

By: (Signature): _____ Date: _____

(Print Name): _____

WORK AREA

Location: _____

Room: _____

Hazard Reduction Performed:

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APPENDIX C

SUMMARY OF ASBESTOS RESULTS

Sample #	Material	Location	Condition	Asbestos (%)
7439-B-01	Roof Patch Mastics	Roof	Intact	5% Chrysotile

Reading No	Time	Duration	Sequence	Mode	Facility	Room	Side	Component	Condition	Substrate	Color	Results	PbC	Units
1	8/10/2017 11:28	325.8	Final										1	cps
2	8/10/2017 11:40	20	Final	K & L				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
3	8/10/2017 11:41	20	Final	K & L				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
4	8/10/2017 11:43	20	Final	K & L				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
5	8/10/2017 11:47	1.1	Final	Std.	FAA FLIGHT OP	NORTH ENTRY	A	DF	INTACT	METAL	BROWN	Negative	0.05	mg / cm ^2
6	8/10/2017 11:47	1.11	Final	Std.	FAA FLIGHT OP	NORTH ENTRY	A	DF	INTACT	METAL	BROWN	Negative	0	mg / cm ^2
7	8/10/2017 11:48	1.11	Final	Std.	FAA FLIGHT OP	NORTH ENTRY	A	D	INTACT	METAL	BROWN	Negative	0	mg / cm ^2
8	8/10/2017 11:49	1.6	Final	Std.	FAA FLIGHT OP	INTERIOR	A	WALL	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
9	8/10/2017 11:49	1.59	Final	Std.	FAA FLIGHT OP	INTERIOR	B	WALL	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
10	8/10/2017 11:50	3.07	Final	Std.	FAA FLIGHT OP	INTERIOR	B	WALL	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
11	8/10/2017 11:50	0.86	Final	Std.	FAA FLIGHT OP	ENTRY LOBBY	A	TILE FLOOR	INTACT	CERAMIC	BEIGE	Positive	2.2	mg / cm ^2
12	8/10/2017 11:50	0.86	Final	Std.	FAA FLIGHT OP	BREAK ROOM	A	TILE FLOOR	INTACT	CERAMIC	WHITE	Positive	2.1	mg / cm ^2
13	8/10/2017 11:51	1.1	Final	Std.	FAA FLIGHT OP	BREAK ROOM	A	COUNTER	INTACT	DRYWALL	WHITE	Negative	0.5	mg / cm ^2
14	8/10/2017 11:52	1.1	Final	Std.	FAA FLIGHT OP	BATH HALL	A	FLOOR TILE	INTACT	CERAMIC	BLUE	Positive	1.9	mg / cm ^2
15	8/10/2017 11:52	1.71	Final	Std.	FAA FLIGHT OP	RR	A	FLOOR TILE	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
16	8/10/2017 11:53	0.25	Final	Std.	FAA FLIGHT OP	N ENTRY	A	FLOOR TILE	INTACT	CERAMIC	BEIGE	Positive	8.6	mg / cm ^2
17	8/10/2017 11:53	1.23	Final	Std.	FAA FLIGHT OP	RR	A	WALL TILE	INTACT	DRYWALL	WHITE	Negative	0.4	mg / cm ^2
18	8/10/2017 11:54	1.1	Final	Std.	FAA FLIGHT OP	RR	A	WALL TILE	INTACT	DRYWALL	WHITE	Negative	0.29	mg / cm ^2
19	8/10/2017 11:57	3.19	Final	Std.	FAA FLIGHT OP	EXT	A	WALL	INTACT	STUCCO	WHITE	Negative	0	mg / cm ^2
20	8/10/2017 11:58	3.18	Final	Std.	FAA FLIGHT OP	EXT	D	WALL	INTACT	STUCCO	WHITE	Negative	0	mg / cm ^2
21	8/10/2017 11:59	1.11	Final	Std.	FAA FLIGHT OP	EXT	D	DOWNSPOUT	POOR	METAL	WHITE	Negative	0	mg / cm ^2
22	8/10/2017 12:00	1.1	Final	Std.	FAA FLIGHT OP	EXT	A	DOOR	POOR	METAL	BROWN	Negative	0	mg / cm ^2
23	8/10/17 12:03	20	Final	K & L				CALIB. CHECK			RED	Positive	1.1	mg / cm ^2
24	8/10/17 12:04	20	Final	K & L				CALIB. CHECK			RED	Positive	1	mg / cm ^2
25	8/10/17 12:08	20	Final	K & L				CALIB. CHECK			RED	Positive	1	mg / cm ^2
26	8/10/17 12:10	20	Final	K & L				CALIB. CHECK			RED	Positive	1	mg / cm ^2



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 158125-214640

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 08/14/2017**Analyzed By:** Edina Zakar**Date Analyzed:** 08/15/17**Customer PO / Claim#:****Contract Number:****Job Site:** Project No. 7439**Date Sampled****Who Sampled**

08/10/2017

Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-1**Customer Number:** 7439-B-01**Classification:****Description:** Penetration Mastics/Patch**Results:** Asbestos: 5% Chrysotile in Black Penetration Mastic**Analysis Number:** 158125-2**Customer Number:** 7439-B-02**Classification:****Description:** Penetration Mastics/Curb**Results:** Non-Asbestos: 5% Cellulose Fibers in Black Penetration Mastic**Analysis Number:** 158125-3**Customer Number:** 7439-B-03**Classification:****Description:** Penetration Mastics/Seam**Results:** Non-Asbestos: 5% Cellulose Fibers in Black Penetration Mastic**Analysis Number:** 158125-4**Customer Number:** 7439-B-04**Classification:****Description:** Drywall Panel/ North Side**Results:**
A: Non-Asbestos: 1% Glass Fibers in White Drywall
B: Non-Asbestos: 90% Cellulose Fibers in Brown Paperbacking

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
- These test results relate only to the sample(s) identified above.
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- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELANO S. PITT, CIH

Dated: 08/15/2017**REVIEWED BY:**

Michelle Lavalley

Page 1 of 6



H.M. Pitt Labs, Inc.
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Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-5
Customer Number: 7439-B-05
Classification: **Description:** Drywall Panel/ North Side
Results: A: Non-Asbestos: 1% Glass Fibers in White Drywall
B: Non-Asbestos: 90% Cellulose Fibers in Brown Paperbacking

Analysis Number: 158125-6
Customer Number: 7439-B-06
Classification: **Description:** Drywall Panel/ North Side
Results: A: Non-Asbestos: 1% Glass Fibers in White Drywall
B: Non-Asbestos: 90% Cellulose Fibers in Brown Paperbacking

Analysis Number: 158125-7
Customer Number: 7439-B-07
Classification: **Description:** Drywall, Tape, Mud/ South Side
Results: A: Non-Asbestos: Non-Fibrous White Joint Compound
B: Non-Asbestos: 1% Cellulose Fibers in Brown Paperbacking
C: Non-Asbestos: Non-Fibrous White Drywall

Analysis Number: 158125-8
Customer Number: 7439-B-08
Classification: **Description:** Drywall, Tape, Mud/ South Side
Results: A: Non-Asbestos: Non-Fibrous White Joint Compound
B: Non-Asbestos: 1% Cellulose Fibers in Brown Paperbacking
C: Non-Asbestos: Non-Fibrous White Drywall

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APPROVED BY: 
LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY: 
Michelle Lavallee



H.M. Pitt Labs, Inc.

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Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-9

Customer Number: 7439-B-09

Classification:

Description: Drywall, Tape, Mud/ South Side

Results:
A: Non-Asbestos: Non-Fibrous White Joint Compound
B: Non-Asbestos: 1% Cellulose Fibers in Brown Paperbacking
C: Non-Asbestos: Non-Fibrous White Drywall

Analysis Number: 158125-10

Customer Number: 7439-B-10

Classification:

Description: Beige Linoleum/ South Side

Results: Non-Asbestos: 10% Cellulose Fibers in Beige Sheet Vinyl

Analysis Number: 158125-11

Customer Number: 7439-B-11

Classification:

Description: Beige Linoleum/ South Side

Results: Non-Asbestos: 10% Cellulose Fibers in Beige Sheet Vinyl

Analysis Number: 158125-12

Customer Number: 7439-B-12

Classification:

Description: Beige Linoleum/ North Side

Results: Non-Asbestos: 10% Cellulose Fibers in Beige Sheet Vinyl

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APPROVED BY:

LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee



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Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Lab Notes: 72 HR TAT

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-13

Customer Number: 7439-B-13

Classification:

Description: Glue for sub floor stilts/ North Side

Results: Non-Asbestos: 1% Cellulose Fibers in Black Glue

Analysis Number: 158125-14

Customer Number: 7439-B-14

Classification:

Description: Glue for sub floor stilts/ North Side

Results: Non-Asbestos: 1% Cellulose Fibers in Black Glue

Analysis Number: 158125-15

Customer Number: 7439-B-15

Classification:

Description: Glue for sub floor stilts/ North Side

Results: Non-Asbestos: 1% Cellulose Fibers in Black Glue

Analysis Number: 158125-16

Customer Number: 7439-B-16

Classification:

Description: Ceiling Tile 2'x2'/ North Side

Results: Non-Asbestos: 40% Cellulose Fibers and 30% Mineral Wool in White/Gray Ceiling Tile

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APPROVED BY:

Leland S. Pitt

LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee

Michelle Lavallee



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Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-17

Customer Number: 7439-B-17

Classification:

Description: Ceiling Tile 2'x2' North Side

Results: Non-Asbestos: 40% Cellulose Fibers and 30% Mineral Wool in White/Gray Ceiling Tile

Analysis Number: 158125-18

Customer Number: 7439-B-18

Classification:

Description: Ceiling Tile 2'x2' North Side

Results: Non-Asbestos: 40% Cellulose Fibers and 30% Mineral Wool in White/Gray Ceiling Tile

Analysis Number: 158125-19

Customer Number: 7439-B-19

Classification:

Description: Baseboard and Glue/ North Side

Results: Non-Asbestos: Non-Fibrous Brown/Yellow Cove Base Mastic

Analysis Number: 158125-20

Customer Number: 7439-B-20

Classification:

Description: Baseboard and Glue/ North Side

Results: Non-Asbestos: Non-Fibrous Brown/Yellow Cove Base Mastic

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APPROVED BY:

LELANO S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee



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Date Entered: 08/14/2017**Analyzed By:** Edina Zakar**Date Analyzed:** 08/15/17**Customer PO / Claim#:****Contract Number:****Job Site:** Project No. 7439**Date Sampled****Who Sampled**

08/10/2017

Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-21**Customer Number:** 7439-B-21**Classification:****Description:** Baseboard and Glue/ North Side**Results:** Non-Asbestos: Non-Fibrous Brown/Yellow Cove Base Mastic**Analysis Number:** 158125-22**Customer Number:** 7439-B-22**Classification:****Description:** Stucco/ Exterior**Results:**
A: Non-Asbestos: Non-Fibrous White Color Coat
B: Non-Asbestos: Non-Fibrous Gray Stucco**Analysis Number:** 158125-23**Customer Number:** 7439-B-23**Classification:****Description:** Stucco/ Exterior**Results:**
A: Non-Asbestos: Non-Fibrous White Color Coat
B: Non-Asbestos: Non-Fibrous Gray Stucco**Analysis Number:** 158125-24**Customer Number:** 7439-B-24**Classification:****Description:** Stucco/ Exterior**Results:**
A: Non-Asbestos: Non-Fibrous White Color Coat
B: Non-Asbestos: Non-Fibrous Gray Stucco

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APPROVED BY:

LELAND S. PITT, CIH

Dated: 08/15/2017**REVIEWED BY:**

Michelle Lavallee

Page 6 of 6

CITY OF SAN DIEGO
Environmental Services Department
ALMP/LSHHP - Laboratory Submittal

Project # 7439 Submitted by: Wm. Brad Blondet Date: 8 / 10 / 2017 Page 1 of 3

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME:
 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER: _____

The receiving Laboratory is required to complete the following:

1. All invoices are to be sent to: *Attn. City of San Diego - Environmental Services Department, 9601 Ridgehaven Court, Suite 310 San Diego, CA 92123*
2. Lab reports/invoices are to contain the Project Number listed above. Do not include Purchase Order Numbers on Invoices
3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/ Area	Analyses Requested
Sample # Prefix:	7439-B-01	Penetration Mastics/ Patch	Bulk				PLM
	7439-B-02	Penetration Mastics/ Curb	Bulk				PLM
	7439-B-03	Penetration Mastics/ Seam	Bulk				PLM
	7439-B-04	Drywall Panel/ North side	Bulk				PLM
	7439-B-05	Drywall Panel/ North side	Bulk				PLM
	7439-B-06	Drywall Panel/ North side	Bulk				PLM
	7439-B-07	Drywall, tape, mud/ South side	Bulk				PLM
	7439-B-08	Drywall, tape, mud/ South side	Bulk				PLM
	7439-B-09	Drywall, tape, mud/ South side	Bulk				PLM

NOTES: _____

Relinquished by: <i>William S. [Signature]</i> Date/Time: 8 / 14 / 2017	Relinquished by: <i>[Signature]</i> Date/Time: 8/14/17 @ 11:30
Received by: <i>[Signature]</i> Date/Time: 8/14/17 @ 11:30	Received by: <i>[Signature]</i> Date/Time: 8/14/17 14:30

CITY OF SAN DIEGO
Environmental Services Department
ALMP/LSHHP - Laboratory Submittal

158125

Project # 7439 Submitted by: Wm. Brad Blondet Date: 8 / 10 / 2017 Page 2 of 3

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME:
 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER: _____

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3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample # Prefix:	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/ Area	Analyses Requested
		7439-B-10	Beige linoleum/ South side	Bulk				PLM
		7439-B-11	Beige linoleum/ South side	Bulk				PLM
		7439-B-12	Beige linoleum/ North side	Bulk				PLM
		7439-B-13	Glue for sub floor stilts/ North side	Bulk				PLM
		7439-B-14	Glue for sub floor stilts/ North side	Bulk				PLM
		7439-B-15	Glue for sub floor stilts/ North side	Bulk				PLM
		7439-B-16	Ceiling Tile 2' x 2'/ North side	Bulk				PLM
		7439-B-17	Ceiling Tile 2' x 2'/ North side	Bulk				PLM
		7439-B-18	Ceiling Tile 2' x 2'/ South side	Bulk				PLM

NOTES:

Relinquished by: <i>William S. Blondet</i>	Relinquished by: <i>[Signature]</i>
Date/Time: 8 / 14 / 2017	Date/Time: 8/14/17 @ 1355
Received by: <i>[Signature]</i>	Received by: <i>[Signature]</i>
Date/Time: 8/14/17 @ 1130	Date/Time: 8/14/17 14:30

CITY OF SAN DIEGO
Environmental Services Department
ALMP/LSHHP - Laboratory Submittal

158125

Project # 7439 Submitted by: Wm. Brad Blondet Date: 8 / 10 / 2017 Page 3 of 3

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME:
 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER: _____

The receiving Laboratory is required to complete the following:

1. All invoices are to be sent to: *Attn. City of San Diego - Environmental Services Department, 9601 Ridgehaven Court, Suite 310 San Diego, CA 92123*
2. Lab reports/invoices are to contain the Project Number listed above. Do not include Purchase Order Numbers on Invoices
3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/Area	Analyses Requested
Sample # Prefix:	7439-B-19	Baseboard and glue/ North side	Bulk				PLM
	7439-B-20	Baseboard and glue/ North side	Bulk				PLM
	7439-B-21	Baseboard and glue/ South side	Bulk				PLM
	7439-B-22	Stucco/ Exterior	Bulk				PLM
	7439-B-23	Stucco/ Exterior	Bulk				PLM
	7439-B-24	Stucco/ Exterior	Bulk				PLM

NOTES: _____

Relinquished by: <i>William B. Blondet</i> Date/Time: 8 / 14 / 2017	Relinquished by: <i>[Signature]</i> Date/Time: 8/14/17 @ 1355
Received by: <i>[Signature]</i> Date/Time: 8/14/17 @ 1130	Received by: <i>[Signature]</i> Date/Time: 8/14/17 14:30



Environmental Services Department
Disposal & Environmental Protection

LEAD RELATED CONSTRUCTION

SPECIFICATION

for

Montgomery Field Fire Rescue Air Operations Facility

October 19, 2017

Prepared by:

A handwritten signature in black ink, appearing to read "William B. Blondet", written over a horizontal line.

Wm. Brad Blondet

Asbestos & Lead Program Inspector

CDPH IA/PM/S License# 5464

Reviewed by:

A handwritten signature in black ink, appearing to read "George Katsikaris", written over a horizontal line.

George Katsikaris

Asbestos & Lead Program Manager

CDPH IA/PM License# 20618

City of San Diego
Environmental Services Department
Disposal & Environmental Protection
Asbestos & Lead Management Program
9601 Ridgehaven Court, Ste 320
San Diego, CA 92123
Tel: (858) 492-5086
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I. GENERAL REQUIREMENTS

A. DESCRIPTION OF WORK

Scope of Work: Lead safe work practices and containment of lead dust during ceramic tile removal.

1. CONTRACTOR shall supply all labor, transportation, material, apparatus, and equipment for the removal, and disposal of lead containing materials to be impacted as a result of this project.
2. CONTRACTOR must use lead safe work practices on all surfaces containing lead in the paint in excess of 0.5mg/cm² or 1,000mg/kg as identified in Appendix C of this section.
3. CONTRACTOR shall be responsible for ensuring the surrounding areas will not be contaminated with lead containing materials during work and shall be responsible for any clean-up determined necessary by City of San Diego's PROJECT MONITOR.
4. Before submission of bids the CONTRACTOR shall visit the project site and verify the location and quantities of the lead containing materials that will be removed under the terms and conditions of this specification.
5. All paint chips collected must be stored in sealable drum containers (not in bags). Paint chips will be considered as hazardous waste.
6. Work shall be performed within agreed upon hours submitted prior to project start which will not include designated City holidays.
7. Before the beginning of work the CONTRACTOR shall hold a safety construction meeting with all supervisors, workers, and other contractors on-site that provides an overview of the accepted work plan, decontamination procedures specific to this project (decontamination procedures shall be on paper with copies for all present), and disposal plan for this project. Meeting shall include the PROJECT MONITOR and any other designated City representative.
8. Construction debris shall be profiled before leaving the jobsite. The CONTRACTOR shall perform the profile testing of the construction debris.

B. CONTRACTOR USE OF THE PREMISES

1. All site rules and regulations affecting the work should be complied with while engaged in project activities. The existing building should be maintained in a safe condition throughout construction activities. The CONTRACTOR will be responsible for adhering to all applicable building codes and fire safety requirements.
2. All public areas will be kept free of accumulated waste, materials, rubbish, and debris.

C. PROJECT COORDINATION

1. It will be the responsibility of the CONTRACTOR to coordinate all site activities with the City's Asbestos & Lead Management Program's (ALMP) PROJECT MONITOR including any meetings, surveys, special reports, and site usage limitations.

D. PROJECT SUBMITTALS

The CONTRACTOR shall not commence any work until approval has been given from the PROJECT MONITOR. The CONTRACTOR shall submit the following at least 30 days prior to commencement of any construction activities:

1. Work Plan:

a) Submit a detailed job-specific plan that includes:

(1) The procedures proposed to comply with the requirements of this specification and all applicable regulations.

(2) Detailed drawings that identify the location, size, layout and details of the Work Areas, any equipment, disposal storage, restrooms, and worker decontamination facilities.

(3) The sequencing of work and the interface of trades involved in the performance of work. Provide a time line that details each major phase of work activity and anticipated time it will occur.

(4) The methods to be used to assure the safety of occupants and visitors to the site.

(5) A description of methods to be used to control dispersion of hazardous materials to the interior and exterior of the building.

(6) The method of removal to minimize dust generation in the Work Area.

b) Work site coordination submittals including:

(1) Contingency and Spill Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, or any other event that may require modification or abridgement of decontamination or Work Area isolation procedures. Include in plan specific procedures for decontamination or Work Area isolation. Plan should be specific for all types of hazardous materials or situations specific to this work site. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.

(2) Telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.

2. Notifications:

- a) Permits, notifications, and licenses needed to perform work (including hazardous waste hauler's registration)
 - b) Notify emergency service agencies including fire, ambulance, police or other agency that may service the work site in case of an emergency. Notification is to include methods of entering Work Area, emergency entry and exit locations, modifications to fire notification or fire-fighting equipment, and other information needed by agencies providing emergency services.
 - c) Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this contract or the contract sum.
 - d) Provide submittal identifying person responsible for responding to project site emergencies twenty-four hours a day, seven days a week.
3. CONTRACTOR qualifications and personnel information submittals that include but are not limited to:
- a) Provide all staff names, certifications, and experience. Identify their duties and responsibilities on this project. CONTRACTOR shall have the following minimum levels of qualified supervision on the project site:
 - (1) General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of Lead Related Construction projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the CONTRACTOR's representative responsible for compliance with all applicable federal, state and local regulations and guidelines. Should, in the opinion of the OWNER, any language barrier exist between the on-site superintendent and the OWNER or PROJECT MONITOR, the CONTRACTOR shall employ a qualified full-time interpreter or provide a new on-site superintendent at no additional cost to the OWNER. Shall be EPA
 - (2) Foreman: Provide a full time Foreman to directly supervise and direct no more than 10 workers. Each Foreman will act as the Competent Person for the workers the foreman is directing. The Foreman has oversight authority over the workers and reports to the General Superintendent. If there are 10 or fewer workers on the project the General Superintendent may fill the Foreman's position.
 - (3) Experience and Training: The General Superintendent and Foreman must have attended an 8 hour EPA accredited Renovate, Repair, Painting Contractor training and possess a current certification as outlined in 40 CFR 745, Subpart E. They shall also have experience with projects of similar types and sizes.

- (4) Workers: All workers shall have attended a tailgate training as outlined in 40 CFR 745, Subpart E or have a signed proof of training onsite.
 - (5) Certificate of Worker's Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found in Appendix A of this section, for each worker and supervisor who is to be at the job site or enter the Work Area.
- b) Identify state licensed transporter, disposal location, and associated permits for all hazardous waste.
 - c) Submit respiratory protection information and air monitoring data as per the following:
 - (1) Operating Instruction: Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.
 - (2) Respiratory Protection Program: Submit CONTRACTOR's written respiratory protection program manual as required by 8 CCR 1531 and 5144.
 - (3) Respiratory Protection Schedule: Submit level of respiratory protection intended for each operation required by the project.
 - (4) Copies of current respirator fit test: Fit tests must be performed every 6 months.
 - d) Submit doctor's report from medical examination conducted within the last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, the following for each worker:
 - (1) Name and Social Security Number
 - (2) Copies of Blood Lead Levels and Zinc Protoporphyrin tests
 - (3) Physicians Written Opinion from examining physician including at a minimum the following:
 - (a) Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to lead. Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.
 - (b) Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from lead exposure.

- e) Submit a notarized certification, signed by an officer of the CONTRACTOR firm that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 8 CCR 1529.
 - f) Identify the laboratory that will be performing the analysis of the personal samples and provide their accreditation. Also discuss the method by which the CONTRACTOR will provide the analytical results to the PROJECT MONITOR within 24 hours of sampling completion.
4. Submit the following during and at the completion of the work
- a) Copies of all Waste Shipment Records
 - b) Copies of all air monitoring results within 24 hours
5. At the end of a project, the CONTRACTOR shall submit the following to the PROJECT MONITOR:
- a) Personal Air Sample Results
 - b) Copies of Project Daily Logs
 - c) Containment Entry/Exit Logs
 - d) Waste Disposal Documentation
 - e) Certificate of Visual Inspection

E. SCHEDULES AND REPORTS

1. Prior to each phase of project, the CONTRACTOR shall provide the City with a tentative time line which outlines the project schedule. These documents will be reviewed and approved by the City prior to the commencement of work.

F. PRODUCT DATA

1. The CONTRACTOR shall submit product information that is to be used during the construction activities prior to commencement of work. General information required includes manufacturer's standard printed recommendations for application and use, compliance with recognized standards of trade association and testing agencies, and safety data sheets (SDSs).
2. Polyethylene sheet
- a) A single polyethylene film in the largest sheet size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and clear, frosted, or black as indicated.
 - b) Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and frosted or black as indicated.
 - c) Reinforced Polyethylene Sheet: Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film

that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, frosted or black as indicated.

3. Tape
 - a) Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
4. Spray adhesive
 - a) Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

G. PROJECT CLOSE-OUT

1. Upon completion of work and prior to payment, the PROJECT MONITOR will proceed with an initial inspection of the work area. A Certificate of Visual Inspection (Appendix B) will be signed by both the CONTRACTOR and PROJECT MONITOR. The CONTRACTOR will not be paid until the area meets the established project-specific clearance criteria and has submitted the required information.

II. DEFINITIONS

- A. ACCREDITED or ACCREDITATION (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).
- B. ACTION LEVEL: An 8-hour time weighted average (TWA) lead airborne concentration of 30 µg/m³.
- C. AIR MONITORING: The process of measuring the lead content of a specific volume of air.
- D. AUTHORIZED VISITOR: The Owner, the Owner's Representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
- E. BARRIER: Any surface that seals off the work area to inhibit the movement of dust.
- F. BREATHING ZONE: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- G. CONTAINMENT: A process for protecting both workers and environment by controlling exposures to lead dust and debris created during Lead Related Construction.
- H. CONTAMINATE: Refers to lead-containing dust/debris.
- I. CONTRACTOR: An EPA RRP Firm Certified painting contractor or their designated sub-contractor performing the required Lead Related Construction outlined in this specification.

- J. DEMOLITION: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- K. DISPOSAL BAG: A properly labeled 6 mil thick leak tight plastic bags used for transporting lead waste from work site to disposal site.
- L. ENCAPSULATION: Any covering or coating that acts as a barrier between lead based paint and the environment and that relies on adhesion and the integrity of the existing paint bonds between layers and with the substrate for its durability.
- M. ENCLOSURE: The use of rigid durable construction materials that are mechanically fastened to the substrate in order to act as a barrier between lead based paint and the living or work space.
- N. HEPA FILTER: A high Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of all mono-dispersed particles greater than 0.3 microns in diameter or larger.
- O. HEPA FILTER VACUUM COLLECTION EQUIPMENT (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining lead.
- P. HIGH PHOSPHATE DETERGENT: Detergent which contains at least 5% tri sodium phosphate.
- Q. LEAD: Means metallic lead, all inorganic lead compounds, and organic lead soaps.
- R. LEAD-BASED PAINT (LBP): For purposes of this project, LBP refers to the materials identified in these specifications as having paint or coatings that contains lead.
- S. LEAD-RELATED CONSTRUCTION SUPERVISOR: Means an individual who is responsible for implementing lead-related construction work and enforcing work practices. This person must have received certification as a lead-related construction Supervisor.
- T. LEAD-RELATED CONSTRUCTION WORK: Means any construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of a building, including preparation and cleanup, by disturbing lead-containing material that may result in exposure of individuals to lead.
- U. LEAD-RELATED CONSTRUCTION WORKER: Means any individual who performs lead-related construction work in a building under the direction of lead-related construction Supervisor, and has received certification as a lead-related construction Worker.
- V. OWNER: Refers to the City of San Diego
- W. PAINT FILM STABILIZATION: The process of using wet scraping, priming, and repainting a deteriorated lead based paint film in a dwelling including clean-up and clearance.

- X. PAINT REMOVAL: A strategy of abatement which entails removing lead based paint from surfaces of components using chemicals, heat guns below 11000F, and certain contained abrasive methods but not open flame burning, open abrasive blasting, sandblasting, water blasting, extensive dry scraping, or methylene chloride removers.
- Y. PERMISSIBLE EXPOSURE LIMIT (PEL): An 8-hour TWA lead airborne concentration of 50 µg/m³.
- Z. PERSONAL MONITORING: Sampling of contaminant concentrations within the breathing zone of an employee.
- AA. PROJECT MONITOR: City of San Diego Asbestos & Lead Management Program staff or their designated consultant.
- BB. PROTECTION FACTOR: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- CC. RRP: EPA's Renovation, Repair and Painting certification that requires contractor training and lead-safe work practices when performing renovation type activities in housing built prior to 1978.
- DD. REPLACEMENT: A strategy of abatement which entails the removal of components such as windows, doors, and trim that have lead painted surfaces and installing new components free of lead paint.
- EE. RESPIRATOR: A device designed to protect the wearer from the inhalation of harmful contaminants.
- FF. TESTING LABORATORIES: A "testing laboratory" is an entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on, and, if required, to interpret results of, those inspections or tests.
- GG. TIME-WEIGHTED AVERAGE (TWA): The average concentration of a contaminant in air during a specific time period.
- HH. TRIGGER TASKS: Work tasks that require an employer to assume specified employee exposures until the employer has performed an exposure assessment [see T8CCr, 1532.1 (d) (2)].
- II. WET CLEANING: The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of appropriately.

- JJ. WORK AREA: The area where Lead Related Construction operations are performed which is defined and/or isolated to prevent the spread of contamination, and entry by unauthorized personnel.

III. SITE WORK

A. INTRODUCTION

This portion of the specification describes procedures and protocols for Lead Related Construction. The protocols/procedures described hereafter are in accordance with federal/state/local requirements. In the absence of these requirements, the procedure/protocols are based on current industry standards.

B. BACKGROUND INFORMATION

Sampling of building materials has been performed by inspectors from the City's Asbestos and Lead Management Program (ALMP) and has been provided in Appendix C of this specification. The CONTRACTOR shall visit the project site and verify the location and quantities of the lead containing materials that will be removed under the terms and conditions of the contract and this specification

C. GENERAL INFORMATION

1. Potential Hazards

a) The disturbance of lead containing materials may cause exposure to workers and building occupants. All workers, supervisory personnel, subcontractors, and consultants who will be at the job site, need to be apprised of the seriousness of the hazard and of proper work practices which must be followed to minimize exposure. The procedures and methods described herein must be followed and the CONTRACTOR must comply with all applicable federal/state/local requirements.

2. Stop Work

a) If the PROJECT MONITOR presents a verbal or written stop work order, the CONTRACTOR shall immediately and automatically stop all work. Recommencement of the work may not begin until authorized by the PROJECT MONITOR.

D. PROJECT ADMINISTRATION

1. Certified Supervisor

The CONTRACTOR needs to provide a full-time lead supervisor who must have attended an 8 hour EPA accredited Renovate, Repair, Painting Contractor training and possess a current certification in accordance with 40 CFR 745, Subpart E. They shall also be experienced in administration and supervision of Lead Related Construction projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person will act as the competent person on the job. In addition, all workers shall have attended an RRP tailgate training as outlined in 40 CFR 745, Subpart E on have a signed proof of training onsite.

E. SPECIAL REPORTS

1. Reporting Unusual Events

When an event of unusual and significant nature occurs at the site (e.g., a spill of lead debris, failure of special equipment used to contain lead), the CONTRACTOR shall prepare and submit a special report listing the chain of events, persons participating, response by Contractor's personnel, evaluation of results, and other pertinent information.

2. Reporting Accidents

The CONTRACTOR shall prepare and submit reports of significant accidents at the subject site. Pertinent data and actions need to be recorded. In addition, response actions should comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury or potential environmental contamination.

F. COMPLIANCE WITH CODES AND REGULATIONS

1. Except to the extent that more explicit, or more stringent requirements are written directly into this Specification, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

2. The CONTRACTOR will assume full responsibility and liability for the compliance with all applicable federal/state/local regulations pertaining to work practices, protection of workers, and visitors to the site, persons occupying areas adjacent to the site, hauling, and disposal of waste. The CONTRACTOR shall hold the City and its representative harmless for the CONTRACTOR's failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of itself, its employees, or its subcontractors,

3. State requirements which govern lead hazard control activities or hauling and disposal of hazardous waste include, but are not limited to, the following:

a) California Occupational Safety and Health Administration (Cal/OSHA):

(1) Division of Industrial Safety; Chapter 4

(2) 8CCR, Section 1532.1, Lead in Construction

- (3) 8CCR, Section 5194, Hazard Communication Standard
 - (4) 8CCR, Section 1531, Construction Respiratory Protection Standard
 - (5) 8CCR, Section 1514, Construction Personal Protective Equipment
 - (6) 8CCR, Section 1509, Construction Injury Illness Prevention Program
 - (7) 8CCR, Section 6003-4, Accident Prevention Signs and Tags
 - (8) 8CCR, Section 3204, Access to Employee Exposure Medical Records
- b) California Environmental Protection Agency (Cal/EPA):
- (1) 22CCR, Division 4.5, Environmental Health Standards for the Management of Hazardous Waste.
- c) California Department of Public Health (CDPH):
- (1) 17CCR, Division 1, Chapter 8, Accreditation of training providers and interim certification of individuals engaged in lead-related construction work.
4. Federal requirements which govern lead hazard control activities or hauling and disposal of hazardous waste include, but are not limited to, the following:
- a) Federal Environmental Protection Agency (FED/EPA):
 - (1) Hazardous Waste Standards, 40 Code of Federal Regulations (CFR), Part 261
 - (2) EPA Renovate, Repair, Painting (RRP), 40 CFR 745, Subpart E.
 - b) U.S. Department of Transportation (DOT):
 - (1) Hazardous Substances, 49CFR, Parts 171 through 180
 - c) American National Standards Institute, Inc. (ANSI):
 - (1) Z9.2-79 Fundamentals Governing the Design and Operation of Local Exhaust
 - (2) Z88.2-80 Practices of Respiratory Protection
 - d) Department of Housing and Urban Development (HUD):
 - (1) Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing (most current draft or final copy)
5. In addition, the CONTRACTOR must comply with any applicable regulations promulgated as a result of Title X, the Residential Lead Based Paint Hazard Reduction Act and Title IV, Lead Exposure Reduction Act.

6. Local requirements which govern lead hazard control activities include, but are not limited to, the following:
 - a) Air Pollution Control District (APCD) - San Diego County
 - (1) APCD Rules and Regulations, Rule 51 (Public Nuisance), Rule 10-11 (permitting of equipment)
 - b) San Diego Municipal Code §54.1001 etc. seq.
 - (1) Prevents, identifies and remedies lead hazards within the City of San Diego

G. PERMITS AND LICENSES

The CONTRACTOR shall submit to the City in the bid submittal any permits or licenses necessary to carry out this work.

1. Permits

A valid Hazardous Waste Hauler registration is required for transporting any hazardous waste. Certain types of equipment require APCD permits (e.g., abrasive blasters).

2. Licenses

The CONTRACTOR must be certified by the California Contractors State License Board. The Contractor, or its subcontractor, shall have current licenses, as required by all applicable state or local jurisdictions for the removal, transportation, disposal, or other regulated activity relative to the work described in this plan.

H. HEALTH AND SAFETY

This section describes the equipment and procedures required for protecting workers from lead contamination and other workplace hazards.

1. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work.
2. Training
 - a) CONTRACTOR workers shall be trained in accordance with 40 CFR 745, Subpart E and have a signed proof of training onsite.
 - b) Workers must be provided with initial biological monitoring (blood sampling) if they are occupationally exposed on any day to lead at or above the Action Level (AL). Employees must be provided with biological monitoring and a medical examination if they are occupationally exposed to lead above the action level for more than 30 days in any consecutive 12 month period. Periodic biological monitoring and medical examinations must be performed according to the schedule and criteria specified in T8CCR, Section 1532.1(j). In addition, employees performing "trigger" tasks must be included in biological monitoring and/or medical examinations based on their assumed exposure. In the absence of specific airborne exposure data, medical surveillance will need to be provided for all workers.

c) At a minimum, examinations shall meet all requirements as set forth in T8CCR, Section 1532.1. Furthermore, if an employee's blood levels are at or above 20µg/dl they will not be allowed to work on the project and shall be medically removed until two consecutive blood lead tests show the employee's blood lead level under 15µg/dl.

d) In addition, evaluations of each individual's ability to work in environments capable of producing heat stress in the worker should be completed. Employees who wear respirators must be medically evaluated.

3. Protective clothing

a) Coveralls: Provide disposable "full body" coveralls and disposable head covers, and require that they be worn at all times by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

b) Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with lead containing material. Thoroughly clean, decontaminate and bag boots before removing them from Work Area at the end of the work.

c) Hard Hats: Provide head protection (hard hats) as required by OSHA for all workers, and provide 1 spare for use by Owner's Representative, Project Administrator, and Owner. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of the type with plastic strap suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

d) Goggles: Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

e) Gloves: Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as lead contaminated waste at the end of the work.

4. Respirators

a) Air Purifying Respirators

(1) Respirator Bodies: Provide half face or full face type respirators based upon appropriate protection factor as determined by the CONTRACTORS competent person. .

(2) Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Lead Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In

addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

(3) Non permitted respirators: Do not use single use, disposable or quarter face respirators.

(4) Require that respiratory protection be used at all times when there is any possibility of disturbance of lead containing or other hazardous materials whether intentional or accidental.

(5) Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne dust until the area has been cleared for re occupancy.

(6) Regardless of Airborne Levels: Require that the minimum level of respiratory protection used be a half-face air purifying respirators with high efficiency filters.

b) Fit testing

(1) Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection course of training. Only allow an individual to use respirators for which training and fit testing has been provided.

(2) Upon Each Wearing: Require that each time an air purifying respirator is put on it be checked for fit with a positive and negative pressure fit check in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).

c) Respirators, disposable coveralls, head covers, and foot covers shall be provided by the CONTRACTOR for the City of San Diego's Asbestos and Lead Management Program's PROJECT MONITOR, and other authorized representatives who may inspect the job site. Provide two (2) respirators and six (6) complete coveralls and, where applicable, six (6) respirator filter changes per day.

5. Materials and Equipment

a) Only material and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards, may be used.

6. Water Service

a) The CONTRACTOR will be able to obtain water services from on-site facilities. The City will designate the facilities from which water service may be obtained.

7. Electrical Services

a) The CONTRACTOR will be able to obtain electrical services from on-site facilities. The City will designate the facilities from which electrical services may be obtained. The CONTRACTOR shall provide their own electrical hook-ups, i.e. spider boxes, ground fault circuit interrupter (GFCI) etc. and installed by a licensed electrician.

b) The electrical services need to comply with the applicable NEMA, NECA, and UL standards, and governing regulations for materials and lay-out of temporary electrical services.

8. Sanitary Facilities

a) The CONTRACTOR shall provide sanitary facilities on-site if none have been made available by the City.

9. Fire Extinguisher

a) Applicable recommendations of the National Fire Protection Association (NFPA) Standard 10, "Standard for Portable Fire Extinguishers," must be complied with by the Contractor. Fire extinguishers need to be located where they are most convenient and effective for their intended purpose, but not less than one (1) extinguisher in each work area, the equipment room, outside/work areas, and in the clean room.

10. First Aid

a) The CONTRACTOR will need to provide first aid supplies which should comply with the governing regulations and recognized recommendations within the construction industry.

I. WORK AREA PROCEDURES

1. General guidelines for performing lead hazard control activities are presented in this section and are based on procedures established by HUD for residential settings. Due to the difference between residential settings and commercial buildings, these procedures will be modified on a case-by-case basis.

2. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. Food and drinks are not allowed in the restricted work area.

3. CONTRACTOR shall secure work area from access by public, staff or users of the area. Accomplish this where possible, by locking doors, gates, or other means of access to the area.

4. Barricade fencing is required for securing an outside area from unauthorized access. Work area delineation shall occur at no less than twelve feet (12') from the radius of the work and/or building. Yellow caution tape shall not be used.

5. All windows, vents, mechanical systems, etc., in close proximity to the work area shall be sealed with plastic and tape by the CONTRACTOR prior to the work beginning.

6. A visitor entry and exit-log, and an employee daily sign-in log will be maintained throughout the lead hazard control activities. The CONTRACTOR shall be responsible for the project site security during the operations in order to protect work efforts and equipment.

J. REMOVAL OF LEAD CONTAINING MATERIALS

1. Lead containing materials shall be adequately wetted with water or a removal encapsulant before and during removal process, to reduce dust emission.
2. The CONTRACTOR should exercise caution in using water, as he will be solely responsible for any water damage to the facility resulting from the work.
3. CONTRACTOR is responsible for keeping all hazardous debris within the containment area at all times throughout removal. Any interior contamination, if created, is the responsibility of the CONTRACTOR to clean with no additional cost to this contract.
4. CONTRACTOR shall ensure there is no loose debris around the Work Area during the removal and if found, CONTRACTOR shall clean the area immediately.

K. CLEANING

1. Daily cleaning includes removing large and small debris, HEPA vacuuming horizontal surfaces, wet mopping, and then HEPA vacuuming horizontal surfaces, and possible exterior cleaning.
2. Final cleaning must occur no sooner than one (1) hour after lead hazard control activities are finished. All plastic should be misted, cleaned, and folded toward the center to trap any remaining dust. The order of removal should be upper plastic, the first layer of floor plastic, vent and door plastic, the second layer of floor plastic, and finally plastic separating contaminated from non-contaminated areas. Then the entire area should be cleaned using a HEPA vacuum/wet wash/HEPA vacuum cycle. This should be from ceiling to floor. Paint or otherwise seal treated surfaces with the exception of interior floors (floors will be sealed after clearance). The Supervisor should perform an inspection for visible dust and debris.
3. Additional cleaning cycles may be necessary for porous surfaces, and difficult to clean surfaces (crevices). Failure to meet clearance criteria will require additional cleaning.

L. DECONTAMINATION PROCEDURE

1. Prior to leaving the Work Area, HEPA vacuum outer suit completely and remove, turning it inside out while doing so.
2. Proceed to decontamination area where the second suit is to be removed while turning it inside out.
3. After wiping all areas and respirator, remove respirator and wipe facial area clean.
4. Place contaminated suits, towels, and respirator cartridges in a properly labeled waste containers.

5. At the completion of the project, boots, hard hats, and goggles should be decontaminated and bagged prior to removal from the Work Area.
6. Equipment leaving the Work Area should be HEPA vacuumed and wet wiped.

M. CLEARANCE

1. Clearance must be performed by a California Department of Public Health (CDPH) Certified Lead PROJECT MONITOR. It will not be performed by the CONTRACTOR (although the CONTRACTOR may perform their own clearance testing). Clearance testing must occur no sooner than one (1) hour after final cleaning. It consists of two steps; visual examination and possibly environmental sampling (dust and/or soil sampling).

a) Visual Examination for Determination of Completed Work:

(1) This is a determination that the work specified in the scope of work has been completed satisfactorily. For surfaces that are to be re-painted, it is important this examination occurs prior to the re-painting (to determine that either all the paint has been removed or that the deteriorated paint has been stabilized). Next the surfaces should be examined for settled dust and debris. If dust or debris is visually noted, the CONTRACTOR will be asked to re-clean prior to samples being collected.

(2) If no such dust/debris is found, the independent consultant or PROJECT MONITOR will complete a Certificate of Visual Inspection (Appendix B) for the area or for multiple areas. The Certified Supervisor will also sign this Certificate. The completed form should be submitted to the City at the end of the project.

2. Environmental Sampling:

a) The number and location of dust and/or soil samples will be determined on a case-by-case basis. The clearance criterion to be used is shown in the table below:

Surface Level

(1)	Interior Floors	40 µg/ft ²
(2)	Interior Window Sills	250 µg/ft ²
(3)	Exterior Horizontal Surfaces	400 µg/ft ²
(4)	Exterior Soil*	1000 µg/ft ²

b) Re-cleaning, at the Contractor's expense, will be required for surfaces that do not pass clearance criteria.

c) The cost for additional tests, which may be required as a result of samples failing to meet the release criteria, shall be paid for the Contractor.

This cost shall include all costs associated with sample analysis and collection of additional samples, including Consultant fees.

* Soil may not be impacted as a part of the proposed work but if contamination occurs then levels shall be used for clearances. CONTRACTOR may take background soil samples to determine the preexisting soil conditions.

N. TRANSPORTATION AND DISPOSAL

1. Waste minimization
 - a) The CONTRACTOR is required to make all reasonable efforts to minimize the amount of hazardous waste generated from this project.
2. Waste characterization profile/determination
 - a) The CONTRACTOR shall test any potential hazardous waste generated in accordance with 22 CCR Division 4.5 within ten (10) days and/or prior to the end of the project to determine if it is hazardous waste and requires disposal. All paint chips will be considered hazardous waste and do not require testing. Components with lead paint that has been stabilized shall have a hazardous waste determination made prior to sending to a landfill.
3. Pre-transportation requirements
 - a) Any packaging used to ship hazardous waste off site such as a container, roll-off bin, tank or other device, must comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with 22 CCR Article 3.
 - b) The hazardous waste label must be affixed and filled out when the first amount of hazardous waste is placed in the container. The label must include the initial accumulation date.
 - c) All additional pre-transportation labeling, marking or placarding must be conducted prior to transporting off site and in accordance with 22 CCR Chapter 12, Article 3.
4. All containers and tanks of hazardous waste must be managed in a way which minimizes the threat of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil or surface water which could threaten human health or the environment. Management techniques include containment areas capable of holding the contents of largest container within the containment area. Properly store and secure waste at all times. Do not leave hazardous waste in uncovered or unlocked trucks or dumpsters.
5. A hazardous waste manifest will be completed in accordance with 22 CCR Chapter 12, Article 2 for each shipment of hazardous waste leaving the work site. All waste shall leave the project site by the end of the project. Only The PROJECT MONITOR employees shall sign as the generator on manifests.
6. Disposal of the lead related hazardous wastes shall be by incineration unless otherwise specified by the ALMP.

APPENDIX A

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

CONTRACTOR'S NAME: _____

Working with lead can be dangerous. Inhaling and ingesting lead dust can cause an increase in blood lead levels which can lead to adverse health effects such as kidney damage, elevated blood pressure or infertility.

Your employer's contract with the City for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These items are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must be an EPA certified Renovation, Repair, and Painting (RRP) Contractor or received training from an RRP contractor and be able to provide onsite documentation of training. You should have been trained in the dangers inherent in handling lead and breathing and ingesting lead dust and in proper work procedures and personal and area protective measures. The topics covered in the course must have included the following:

- Possible routes of exposure to lead
- Health hazards associated with lead
- Respiratory protection
- Use of protective equipment
- Work practices including hands on or on-the-job training
- Personal decontamination procedures
- Health and safety considerations

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, physical examination, a blood pressure measurement, pulmonary function test and blood sample and analysis for lead.

By signing this document you are acknowledging only that the City has advised you of your rights to training and protection relative to your employer, the Contractor.

Signature: _____ Social Security No.: _____

Printed Name: _____

Witness (print): _____ Witness Signature: _____

APPENDIX B

CERTIFICATION OF VISUAL INSPECTION

Project # _____ Date: _____ Location: _____

Contractor: _____

The contractor hereby certifies that he/she has visually inspected the Work Area (all surfaces including pipes, counters, ledges, walls, ceiling and floor, behind critical barriers, sheet plastic, etc.) and has found no dust, debris or residue.

By: (Signature): _____ Date: _____

(Print Name): _____

(Company Name): _____

(Print Title): _____

CITY ALMP REPRESENTATIVE

The City ALMP Representative hereby certifies that he has accompanied the contractor on his/her visual inspection and verifies that this inspection has been thorough and to the best of his/her knowledge and belief, the contractor's certification above is a true and honest one.

By: (Signature): _____ Date: _____

(Print Name): _____

WORK AREA

Location: _____

Room: _____

Hazard Reduction Performed:

APPENDIX C

SUMMARY OF LEAD CONTAINING MATERIALS

Sample number	Location	Condition	Concentration of Lead
11	Beige Ceramic Floor Tile Entry Lobby	Intact	2.2 mg/cm ²
12	White Ceramic Floor Tile Break Room	Intact	2.1 mg/cm ²
14	Blue Ceramic Floor Tile Bath Hall	Intact	1.9 mg/cm ²
16	Beige Ceramic Floor Tile North Entry	Intact	8.6 mg/cm ²

APPENDIX B

**MHPA LAND USE
ADJACENCY GUIDELINES
PERMIT CONDITIONS**

MHPA LAND USE ADJACENCY GUIDELINES PERMIT CONDITIONS

[INSERT ANY MSCP CONDITIONS HERE]

X. Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify the Applicant has accurately represented the project's design in or on the Construction Documents (CD's/CD's consist of Construction Plan Sets for Private Projects and Contract Specifications for Public Projects) are in conformance with the associated discretionary permit conditions and Exhibit "A," and also the City's Multi-Species Conservation Program (MSCP) Multi-Habitat Planning Area (MHPA) Land Use Adjacency Guidelines. The applicant shall provide an implementing plan and include references on/in CD's of measures below under the bolded heading of each item.

X. **Grading/Land Development/MHPA Boundaries** - Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify MHPA boundaries onsite and adjacent properties are delineated on the CDs. DSD Planning and/or MSCP staff shall ensure that all grading is included within the approved development/construction footprint, specifically manufactured slopes, disturbance, and development within or adjacent to the MHPA. For projects within or adjacent to the MHPA, all manufactured slopes associated with site development shall be included within the development footprint.

X. **Drainage** - Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify all new and proposed parking lots, staging areas, and developed areas in and adjacent to the MHPA are designed so they do not drain directly into the MHPA. All staging and developed/paved areas must prevent the release of toxins, chemicals, petroleum products, exotic plant materials prior to release by incorporating the use of filtration devices, planted swales and/or planted detention/desiltation basins, or other approved temporary and permanent methods that are designed to minimize negative impacts, such as excessive water and toxins into the ecosystems of the MHPA.

X. **Toxics/Project Staging Areas/Equipment Storage** - Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify projects that use chemicals or generate by-products such as pesticides, herbicides, and animal waste, and other substances that are potentially toxic or impactful to native habitats/flora/fauna (including water) shall incorporate measures to reduce impacts caused by the application and/or drainage of such materials into the

MHPA. No trash, oil, parking, or other construction/development-related material/activities shall be allowed outside any approved construction limits. Provide a note in/on the CD's that states: "All construction related activity that may have potential for leakage or intrusion shall be monitored by the Qualified Biologist/Owners Representative or Resident Engineer to ensure there is no impact to the MHPA."

X. **Lighting** - Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify lighting within or adjacent to the MHPA is directed away/shielded from the MHPA, or limited to the immediate area and is in compliance with City Outdoor Lighting Regulations per LDC Section 142.0740.

X. **Barriers** – Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify construction and new development within or adjacent to the MHPA includes barriers (e.g., non-invasive vegetation; rocks/boulders; 6-foot high, vinyl-coated chain link or equivalent fences/walls; and/or signage) along the MHPA boundaries to direct public access to appropriate locations, reduce domestic animal predation, protect wildlife in the preserve, and provide adequate noise reduction where needed.

X. **Invasives** - Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify no invasive non-native plant species are being introduced into areas within or adjacent to the MHPA.

X. **Noise** - Prior to issuance of any construction permit or notice to proceed, DSD/ LDR, and/or MSCP staff shall verify (due to the site's location adjacent to or within the MHPA) where the Qualified Biologist has identified potential nesting habitat for listed avian species, that construction noise that exceeds the maximum levels (60 dB or greater at the beginning edge of the habitat) allowed shall be avoided during the breeding seasons for the following: least Bell's vireo (3/15-9/15), southwestern willow flycatcher (5/1-8/30). If construction is proposed during the breeding season for the species, USFWS protocol surveys shall be required in order to determine species presence/absence. If protocol surveys are not conducted in suitable habitat during the breeding season for the aforementioned listed species, presence shall be assumed with implementation of noise attenuation and biological monitoring. When applicable (i.e., habitat is occupied or if presence of the covered species is assumed), adequate noise reduction measures shall be incorporated.

SUPPLEMENTARY SPECIAL PROVISIONS
APPENDICES

APPENDIX A
NOTICE OF EXEMPTION (NOE)

NOTICE OF EXEMPTION

(Check one or both)

TO: Recorder/County Clerk
P.O. Box 1750, MS A-33
1600 Pacific Hwy, Room 260
San Diego, CA 92101-2400

FROM: City of San Diego
Public Works Department
525 B Street, Suite 750, MS 908A
San Diego, CA 92101

Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA .95814

Project Name: Fire Rescue Air Operations Facility

Project No.: S-15012.02.06

Project Location-Specific: AFSS/FAA Building on the northern side of Montgomery Field, within the Kearny Mesa Community Planning Area, Council Districts 6

Project Location-City/County: San Diego/San Diego

Description of nature and purpose of the Project: The project will include interior remodel of the existing Automated Flight Service Station (AFSS)/Federal Aviation Administration (FAA) building for use by San Diego Fire-Rescue Air Operations. This will involve conversion of existing office space for use as a designated "station" area providing approximately 6,000 square feet of office and living spaces to accommodate 24 hour staffing for fire rescue staff. The modified facility will include equipment maintenance areas, training rooms, conference room, office and dispatch use, equipment storage, restrooms, kitchen, dining, sleeping and living area for staff, communication system, backup power generator, and electrical mechanical rooms. The project will also involve approximately 193 linear feet of trenching to connect a waterline to a nearby hydrant for the new interior fire sprinkler system, and approximately 43 linear feet of trenching to replace an existing sewer line. Trenching activities at both locations will require an approximate width of 3 feet and depth of 2-3 feet. The project area would be limited to that area already developed for airport use. All vehicles, equipment, materials, and staging must remain on the parking lot or paved road surface. All appropriate BMP's shall be installed and maintained during construction activities to prevent the release of debris, toxins, chemicals, and erosion runoff into adjacent undeveloped areas from the project site.

Name of Public Agency Approving Project: City of San Diego

Name of Person or Agency Carrying Out Project: Natalie de Freitas, 525 B Street, Suite 750, San Diego, CA, 92101, (619) 533-4603

Exempt Status: (CHECK ONE)

- Ministerial (Sec. 21080(b)(1); 15268);
- Declared Emergency (Sec. 21080(b)(3); 15269(a));
- Emergency Project (Sec. 21080(b)(4); 15269 (b)(c))
- Categorical Exemption: 15301- (Existing Facilities), 15303 - (New Construction or Conversion of Small Structures), 15304 - (Minor Alterations to Land)
- Statutory Exemptions:

Reasons why project is exempt: The City of San Diego conducted an environmental review and determined that the project meets the categorical exemption criteria set forth in CEQA State Guidelines, Section 15301 - (Existing Facilities) which allows for the minor alteration of existing public structures and facilities, 15303 - (New Construction or Conversion of Small Structures) which allows for the installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another, and 15304 -

Revised May 2016

(Minor Alterations to Land) which allows for minor public alterations in the condition of land where no removal of healthy, mature, scenic trees would occur, including minor trenching and backfilling where the surface is restored; and where the exceptions listed in Section 15300.2 would not apply. The project has been designed consistent with the City of San Diego Multiple Species Conservation Program (MSCP SAP) Section 1.4.3 Land Use Adjacency Guidelines (LUAGs). With implementation of the MSCP LUAG's and appropriate BMP's, impacts to the MHPA and adjacency vernal pool resources would not result with project implementation.

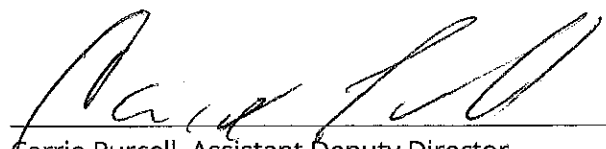
Lead Agency Contact Person: Natalie de Freitas

Telephone: (619) 533-4603

If filed by applicant:

1. Attach certified document of exemption finding.
2. Has a notice of exemption been filed by the public agency approving the project? () Yes () No

It is hereby certified that the City of San Diego has determined the above activity to be exempt from CEQA



Carrie Purcell, Assistant Deputy Director

12/21/17

Date

Check One:

- (X) Signed By Lead Agency
() Signed by Applicant

Date Received for Filing with County Clerk or OPR:

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.)

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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.

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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.

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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

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SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 6 OF 10	EFFECTIVE DATE October 15, 2002
	SUPERSEDES DI 55.27	DATED April 21, 2000

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

CITY OF SAN DIEGO CALIFORNIA DEPARTMENT INSTRUCTIONS	NUMBER DI 55.27	DEPARTMENT Water Department
SUBJECT FIRE HYDRANT METER PROGRAM (FORMERLY: CONSTRUCTION METER PROGRAM)	PAGE 7 OF 10	EFFECTIVE DATE October 15, 2002
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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.

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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
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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).

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.) Zip:	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"/>	<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:	
<small>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</small>			

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:

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

SAMPLE CITY INVOICE WITH SPEND CURVE

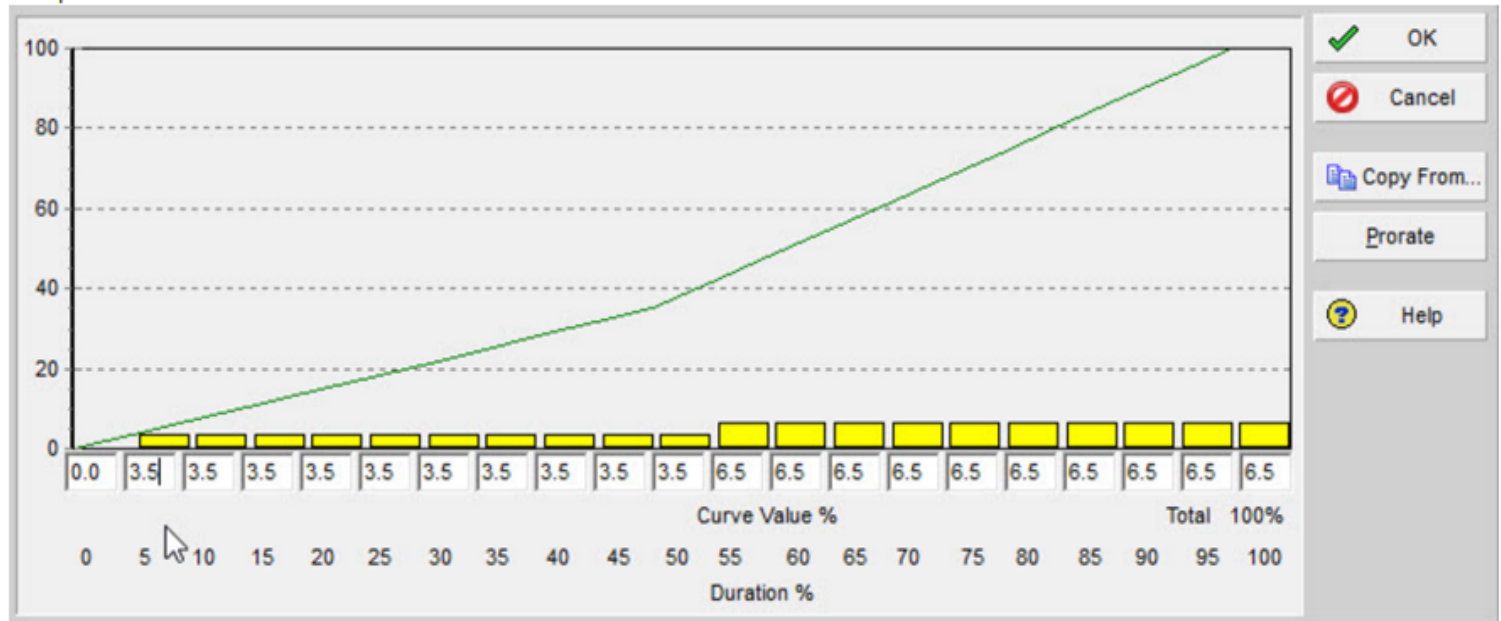
Sample Project Spend Curve

Sample Date Entries Required

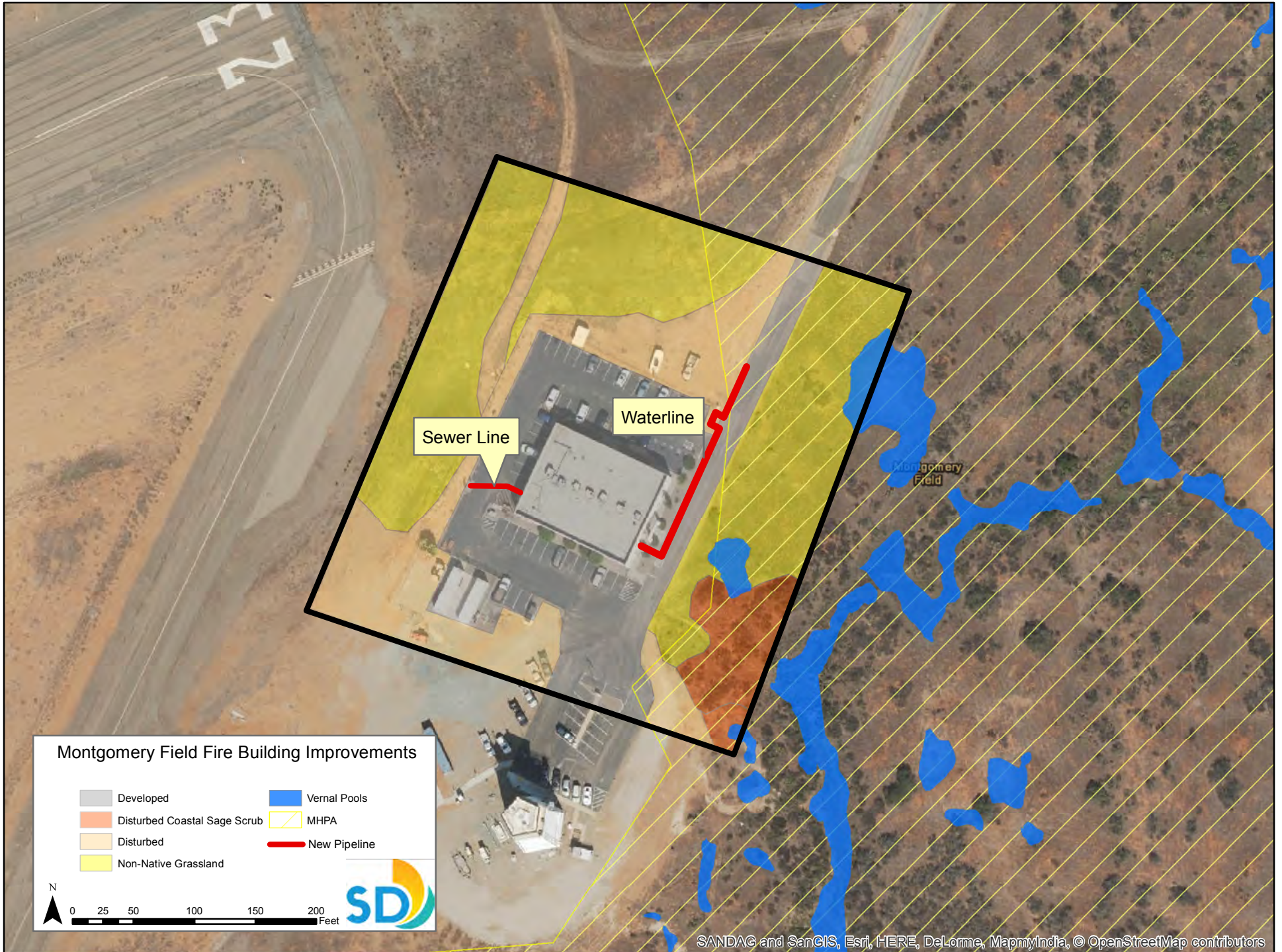
Incremental Curve Value
Duration % Increment

0.0%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%
0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%

Sample Screenshot from Primavera P6



APPENDIX E
LOCATION MAP



APPENDIX F
HAZARDOUS LABEL/FORMS

HAZARDOUS WASTE

STATE AND FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY
AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY
OR THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES

GENERATOR NAME _____

ADDRESS _____ 24 HR. PHONE () _____

CITY _____ STATE _____ ZIP _____

EPA ID NO. _____ MANIFEST DOCUMENT NO. _____

EPA WASTE NO. _____ CA WASTE NO. _____ ACCUMULATION START DATE _____ / ____ / ____

CONTENTS, COMPOSITION _____

PROPER DOT SHIPPING NAME _____

TECHNICAL NAME (S) _____

UN/NA NO. WITH PREFIX _____

PHYSICAL STATE | HAZARDOUS PROPERTIES FLAMMABLE TOXIC
 SOLID LIQUID | CORROSIVE REACTIVE OTHER _____

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

INCIDENT/RELEASE ASSESSMENT FORM ¹

If you have an emergency, Call 911

Handlers of hazardous materials are required to report releases. The following is a tool to be used for assessing if a release is reportable. Additionally, a non-reportable release incident form is provided to document why a release is not reported (see back).

Questions for Incident Assessment:

	YES	NO
1. Was anyone killed or injured, or did they require medical care or admitted to a hospital for observation?	<input type="checkbox"/>	<input type="checkbox"/>
2. Did anyone, other than employees in the immediate area of the release, evacuate?	<input type="checkbox"/>	<input type="checkbox"/>
3. Did the release cause off-site damage to public or private property?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is the release greater than or equal to a reportable quantity (RQ)?	<input type="checkbox"/>	<input type="checkbox"/>
5. Was there an uncontrolled or unpermitted release to the air?	<input type="checkbox"/>	<input type="checkbox"/>
6. Did an uncontrolled or unpermitted release escape secondary containment, or extend into any sewers, storm water conveyance systems, utility vaults and conduits, wetlands, waterways, public roads, or off site?	<input type="checkbox"/>	<input type="checkbox"/>
7. Will control, containment, decontamination, and/or clean up require the assistance of federal, state, county, or municipal response elements?	<input type="checkbox"/>	<input type="checkbox"/>
8. Was the release or threatened release involving an unknown material or contains an unknown hazardous constituent?	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the incident a threatened release (a condition creating a substantial probability of harm that requires immediate action to prevent, reduce, or mitigate damages to persons, property, or the environment)?	<input type="checkbox"/>	<input type="checkbox"/>
10. Is there an increased potential for secondary effects including fire, explosion, line rupture, equipment failure, or other outcomes that may endanger or cause exposure to employees, the general public, or the environment?	<input type="checkbox"/>	<input type="checkbox"/>

If the answer is YES to any of the above questions – report the release to the California Office of Emergency Services at 800-852-7550 and the local CUPA daytime: (619) 338-2284, after hours: (858) 565-5255. Note: other state and federal agencies may require notification depending on the circumstances.

Call 911 in an emergency

If all answers are NO, complete a Non Reportable Release Incident Form (page 2 of 2) and keep readily available. Documenting why a “no” response was made to each question will serve useful in the event questions are asked in the future, and to justify not reporting to an outside regulatory agency.

If in doubt, report the release.

¹ This document is a guide for accessing when hazardous materials release reporting is required by Chapter 6.95 of the California Health and Safety Code. It does not replace good judgment, Chapter 6.95, or other state or federal release reporting requirements.

NON REPORTABLE RELEASE INCIDENT FORM

1. RELEASE AND RESPONSE DESCRIPTION

Incident # _____

Date/Time Discovered	Date/Time Discharge	Discharge Stopped <input type="checkbox"/> Yes <input type="checkbox"/> No
Incident Date / Time:		
Incident Business / Site Name:		
Incident Address:		
Other Locators (Bldg, Room, Oil Field, Lease, Well #, GIS)		
Please describe the incident and indicate specific causes and area affected. Photos Attached?: <input type="checkbox"/> Yes <input type="checkbox"/> No		
Indicate actions to be taken to prevent similar releases from occurring in the future.		

2. ADMINISTRATIVE INFORMATION

Supervisor in charge at time of incident:	Phone:
Contact Person:	Phone:

3. CHEMICAL INFORMATION

Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Chemical	Quantity <input type="checkbox"/> GAL <input type="checkbox"/> LBS <input type="checkbox"/> FT ³
Clean-Up Procedures & Timeline:	
Completed By:	Phone:
Print Name:	Title:

EMERGENCY RELEASE FOLLOW - UP NOTICE REPORTING FORM

A	BUSINESS NAME	FACILITY EMERGENCY CONTACT & PHONE NUMBER () -
B	INCIDENT DATE: MO DAY YR TIME OES NOTIFIED (use 24 hr time)	OES CONTROL NO.
C	INCIDENT ADDRESS LOCATION	CITY / COMMUNITY COUNTY ZIP
D	CHEMICAL OR TRADE NAME (print or type)	CAS Number
D	CHECK IF CHEMICAL IS LISTED IN 40 CFR 355, APPENDIX A <input type="checkbox"/>	CHECK IF RELEASE REQUIRES NOTIFICATION UNDER 42 U.S.C. Section 9603 (a) <input type="checkbox"/>
D	PHYSICAL STATE CONTAINED: <input type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS	PHYSICAL STATE RELEASED: <input type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> GAS
D	ENVIRONMENTAL CONTAMINATION: <input type="checkbox"/> AIR <input type="checkbox"/> WATER <input type="checkbox"/> GROUND <input type="checkbox"/> OTHER	QUANTITY RELEASED TIME OF RELEASE DURATION OF RELEASE _____ DAYS _____ HOURS _____ MINUTES
E	ACTIONS TAKEN	
E		
E		
E		
E		
F	KNOWN OR ANTICIPATED HEALTH EFFECTS (Use the comments section for addition information)	
F	<input type="checkbox"/> ACUTE OR IMMEDIATE (explain) _____	
F	<input type="checkbox"/> CHRONIC OR DELAYED (explain) _____	
F	<input type="checkbox"/> NOTKNOWN (explain) _____	
G	ADVICE REGARDING MEDICAL ATTENTION NECESSARY FOR EXPOSED INDIVIDUALS	
G		
H	COMMENTS (INDICATE SECTION (A - G) AND ITEM WITH COMMENTS OR ADDITIONAL INFORMATION)	
H		
H		
H		
I	CERTIFICATION: I certify under penalty of law that I have personally examined and I am familiar with the information submitted and believe the submitted information is true, accurate, and complete.	
I	REPORTING FACILITY REPRESENTATIVE (print or type) _____	
I	SIGNATURE OF REPORTING FACILITY REPRESENTATIVE _____ DATE: _____	

EMERGENCY RELEASE FOLLOW-UP NOTICE REPORTING FORM INSTRUCTIONS

GENERAL INFORMATION:

Chapter 6.95 of Division 20 of the California Health and Safety Code requires that written emergency release follow-up notices prepared pursuant to 42 U.S.C. § 11004, be submitted using this reporting form. Non-permitted releases of reportable quantities of Extremely Hazardous Substances (listed in 40 CFR 355, appendix A) or of chemicals that require release reporting under section 103(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [42 U.S.C. § 9603(a)] must be reported on the form, as soon as practicable, but no later than 30 days, following a release. The written follow-up report is required in addition to the verbal notification.

BASIC INSTRUCTIONS:

- The form, when filled out, reports follow-up information required by 42 U.S.C § 11004. Ensure that all information requested by the form is provided as completely as possible.
- If the incident involves reportable releases of more than one chemical, prepare one report form for each chemical released.
- If the incident involves a series of separate releases of chemical(s) at different times, the releases should be reported on separate reporting forms.

SPECIFIC INSTRUCTIONS:

Block A: Enter the name of the business and the name and phone number of a contact person who can provide detailed facility information concerning the release.

Block B: Enter the date of the incident and the time that verbal notification was made to OES. The OES control number is provided to the caller by OES at the time verbal notification is made. Enter this control number in the space provided.

Block C: Provide information pertaining to the location where the release occurred. Include the street address, the city or community, the county and the zip code.

Block D: Provide information concerning the specific chemical that was released. Include the chemical or trade name and the Chemical Abstract Service (CAS) number. Check all categories that apply. Provide best available information on quantity, time and duration of the release.

Block E: Indicate all actions taken to respond to and contain the release as specified in 42 U.S.C. § 11004(c).

Block F: Check the categories that apply to the health effects that occurred or could result from the release. Provide an explanation or description of the effects in the space provided. Use Block H for additional comments/information if necessary to meet requirements specified in 42 U.S.C. § 11004(c).

Block G: Include information on the type of medical attention required for exposure to the chemical released. Indicate when and how this information was made available to individuals exposed and to medical personnel, if appropriate for the incident, as specified in 42 U.S.C. § 11004(c).

Block H: List any additional pertinent information.

Block I: Print or type the name of the facility representative submitting the report. Include the official signature and the date that the form was prepared.

MAIL THE COMPLETED REPORT TO:

**State Emergency Response Commission (SERC)
Attn: Section 304 Reports
Hazardous Materials Unit
3650 Schriever Avenue
Mather, CA 95655**

NOTE: Authority cited: Sections 25503, 25503.1 and 25507.1, Health and Safety Code. Reference: Sections 25503(b)(4), 25503.1, 25507.1, 25518 and 25520, Health and Safety Code.

APPENDIX G

SAMPLE OF PUBLIC NOTICE



CONSTRUCTION NOTICE

PROJECT TITLE

Work on your street will begin within one week to replace the existing water mains servicing your community.

The work will consist of:

- Saw-cutting and trench work on Ingulf Street from Morena Boulevard to Galveston Street to install new water mains, water laterals and fire hydrants.
• Streets where trenching takes place will be resurfaced and curb ramps will be upgraded to facilitate access for persons with disabilities where required.
• This work is anticipated to be complete in your community by December 2016.

How your neighborhood may be impacted:

- Water service to some properties during construction will be provided by a two-inch highline pipe that will run along the curb. To report a highline leak call 619-515-3525.
• Temporary water service disruptions are planned. If planned disruptions impact your property, you will receive advance notice.
• Parking restrictions will exist because of the presence of construction equipment and materials.
• "No Parking" signs will be displayed 72 hours in advance of the work.
• Cars parked in violation of signs will be TOWED.

Hours and Days of Operation:

Monday through Friday X:XX AM to X:XX PM.

City of San Diego Contractor:

Company Name, XXX-XXX-XXXX



CONSTRUCTION NOTICE

PROJECT TITLE

Work on your street will begin within one week to replace the existing water mains servicing your community.

The work will consist of:

- Saw-cutting and trench work on Ingulf Street from Morena Boulevard to Galveston Street to install new water mains, water laterals and fire hydrants.
• Streets where trenching takes place will be resurfaced and curb ramps will be upgraded to facilitate access for persons with disabilities where required.
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• Temporary water service disruptions are planned. If planned disruptions impact your property, you will receive advance notice.
• Parking restrictions will exist because of the presence of construction equipment and materials.
• "No Parking" signs will be displayed 72 hours in advance of the work.
• Cars parked in violation of signs will be TOWED.

Hours and Days of Operation:

Monday through Friday X:XX AM to X:XX PM.

City of San Diego Contractor:

Company Name, XXX-XXX-XXXX

APPENDIX H

ADVANCED METERING INFRASTRUCTURE (AMI) DEVICE PROTECTION

Protecting AMI Devices in Meter Boxes and on Street Lights

The Public Utilities Department (PUD) has begun the installation of the Advanced Metering Infrastructure (AMI) technology as a new tool to enhance water meter reading accuracy and efficiency, customer service and billing, and to be used by individual accounts to better manage the efficient use of water. **All AMI devices shall be protected per Section 5-2, "Protection", of the 2015 Whitebook.**

AMI technology allows water meters to be read electronically rather than through direct visual inspection by PUD field staff. This will assist PUD staff and customers in managing unusual consumption patterns which could indicate leaks or meter tampering on a customer's property.

Three of the main components of an AMI system are the:

- A. Endpoints, see Photo 1:

Photo 1



B. AMI Antenna attached to Endpoint (antenna not always required), see Photo 2:

Photo 2



Network Devices, see Photo 3:

Photo 3



AMI endpoints transmit meter information to the AMI system and will soon be on the vast majority of meters in San Diego. These AMI devices provide interval consumption data to the PUD's Customer Support Division. If these devices are damaged or communication is interrupted, this Division will be alerted of the situation. The endpoints are installed in water meter boxes, coffins, and vaults adjacent to the meter. A separate flat round antenna may also be installed through the meter box lid. This antenna is connected to the endpoint via cable. The following proper installation shall be implemented when removing the lid to avoid damaging the antenna, cable, and/or endpoint. Photo 4 below demonstrates a diagram of the connection:

Photo 4



The AMI device ERT/Endpoint/Transmitter shall be positioned and installed as discussed in this Appendix. If the ERT/Endpoint/Transmitter is disturbed, it shall be re-installed and returned to its original installation with the end points pointed upwards as shown below in Photo 5.

The PUD's code compliance staff will issue citations and invoices to you for any damaged AMI devices that are not re-installed as discussed in the Contract Document

Photo 5 below shows a typical installation of an AMI endpoint on a water meter.

Photo 5

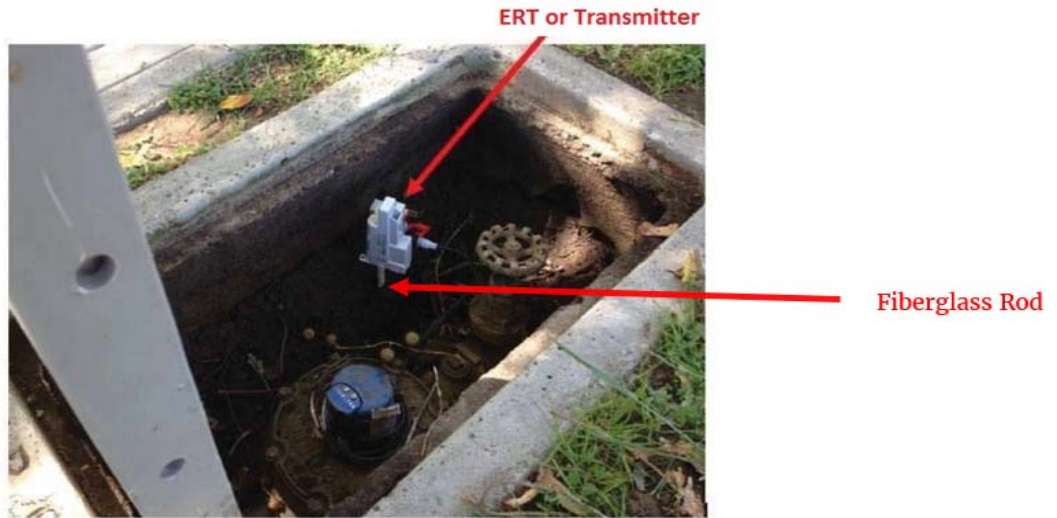


Photo 6 below is an example of disturbance that shall be avoided:

Photo 6



You are responsible when working in and around meter boxes. If you encounter these endpoints, use proper care and do not disconnect them from the registers on top of the water meter. If the lid has an antenna drilled through, do not change or tamper with the lid and inform the Resident Engineer immediately about the location of that lid. Refer to Photo 7 below:

Photo 7



Another component of the AMI system are the Network Devices. The Network Devices are strategically placed units (mainly on street light poles) that collect interval meter reading data from multiple meters for transmission to the Department Control Computer. **If you come across any of these devices on street lights that will be removed or replaced (refer to Photos 8 and 9 below), notify AMI Project Manager Arwa Sayed at (619) 362-0121 immediately.**

Photo 8 shows an installed network device on a street light. On the back of each Network Device is a sticker with contact information. See Photo 9. **Call PUD Water Emergency Repairs at 619-515-3525 if your work will impact these street lights.** These are assets that belong to the City of San Diego and you shall be responsible for any costs of disruption of this network.

Photo 8



Network Device

Photo 9



If you encounter any bad installations, disconnected/broken/buried endpoints, or inadvertently damage any AMI devices or cables, notify the Resident Engineer immediately. The Resident Engineer will then immediately contact the AMI Project Manager, Arwa Sayed, at (619) 362-0121.

APPENDIX I

ASBESTOS AND LEAD MOLD PROGRAM REPORT

CITY of SAN DIEGO
WORK REQUEST FOR ASBESTOS, LEAD & MOLD PROGRAM

5032

Department Public Works Dept.# 2150 Division AEP

Work Requested By James Botica MS# 908A Phone (619) 533-5109

Facility # 950388 Facility Name/Address Montgomery Field - Fire Rescue Air Operations Facility

Year of Construction: 2017 Plans Attached? YES NO Target Start: September 18, 2017

Provide a description and location of the activities **you plan on conducting**:


Scope/Description of Work: The City purchased the old FAA Flight Service Station (FSS) to be converted into the new Fire Rescue Air Operations Facility. The scope is for tenant improvements to the existing FSS. Work includes, but is not limited to, demolition of existing walls, flooring, and equipment (electrical, mechanical, and plumbing). New interior finishes to be installed as well as roofing and pertinent facilities to bring the facility to current Fire Station and Essential Facility Standards.

This request is to have an inspection done for the existing FSS for asbestos, lead, and mold, etc.

Open Internal Order or WBS# to ALMP for labor cost. ALMP Business Area 2115; Fund 100000; Revenue Acct 424071. The following accounting numbers are for laboratory, abatement, and/or other NPE. Request estimate if needed.

Accounting Numbers:	<u>1912180013</u>	<u>400136</u>	<u>512029</u>	<u>S-15012</u>
	Cost Center	Fund	G/L	Internal Order/WBS #

I have the authority to authorize ALMP to bill hourly inspection labor and laboratory expenses to the accounting numbers above for work related to this project.

Signature  Title Assistant Engineer - Civil Date 07/06/2017

Print Name James Botica Div. Analyst Name Brady Balolong

FOR OFFICE USE ONLY

Date Received 07/06/2017 Inspector Brad Blondet

Records/Inspection Information ALMP will provide Lead and Asbestos abatement specifications.
Asbestos present in roofing mastics.

Lead glazing present in entry floor tiles, kitchen floor and hall
to restrooms.

Impact on Project Disturbance of ceramic tiles can cause exposure to lead during the
demolition. An abatement contractor will be needed to contain the area and protect
workers from lead exposure. An abatement contractor will also be needed to remove
asbestos from the roof and schedule with the roofing contractor to perform the work
so that damage does not result from an uncovered roof. Please attached testing reports.

 8/23/17  8/25/2017
ASBESTOS, LEAD & MOLD PROGRAM INSPECTOR DATE ASBESTOS, LEAD & MOLD PROGRAM MANAGER DATE

Asbestos, Lead & Mold Program



H.M. Pitt Labs, Inc.

4901 Morena Blvd · Ste 203 · San Diego, CA 92117

Lab Number: 158125-214640

Tel: 619-474-8548 · Fax: 858-412-3305

Company:

City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 08/14/2017**Analyzed By:** Edina Zakar**Date Analyzed:** 08/15/17**Customer PO / Claim#:****Contract Number:****Job Site:** Project No. 7439**Date Sampled****Who Sampled**

08/10/2017

Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-1**Customer Number:** 7439-B-01**Classification:****Description:** Penetration Mastics/Patch**Results:** Asbestos: 5% Chrysotile in Black Penetration Mastic**Analysis Number:** 158125-2**Customer Number:** 7439-B-02**Classification:****Description:** Penetration Mastics/Curb**Results:** Non-Asbestos: 5% Cellulose Fibers in Black Penetration Mastic**Analysis Number:** 158125-3**Customer Number:** 7439-B-03**Classification:****Description:** Penetration Mastics/Seam**Results:** Non-Asbestos: 5% Cellulose Fibers in Black Penetration Mastic**Analysis Number:** 158125-4**Customer Number:** 7439-B-04**Classification:****Description:** Drywall Panel/ North Side**Results:**
A: Non-Asbestos: 1% Glass Fibers in White Drywall
B: Non-Asbestos: 90% Cellulose Fibers in Brown Paperbacking

- All samples tested as submitted to the lab. H.M. PITT LABS, INC. does not assume responsibility for the accuracy of the information submitted with the samples unless done by an employee of H.M. PITT LABS, INC.
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- Samples are archived for 90 days from date of receipt and will be disposed of properly following this period.
- Quantitative value is based on PLM CVES (Calibrated Visual Estimates) with a detection limit of <1%.

APPROVED BY:

LELANO S. PITT, CIH

Dated: 08/15/2017**REVIEWED BY:**

Michelle Lavalley



H.M. Pitt Labs, Inc.
4901 Morena Blvd · Ste 203 · San Diego, CA 92117

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Company:
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San Diego, CA 92123

Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-5
Customer Number: 7439-B-05
Classification: **Description:** Drywall Panel/ North Side
Results: A: Non-Asbestos: 1% Glass Fibers in White Drywall
B: Non-Asbestos: 90% Cellulose Fibers in Brown Paperbacking

Analysis Number: 158125-6
Customer Number: 7439-B-06
Classification: **Description:** Drywall Panel/ North Side
Results: A: Non-Asbestos: 1% Glass Fibers in White Drywall
B: Non-Asbestos: 90% Cellulose Fibers in Brown Paperbacking

Analysis Number: 158125-7
Customer Number: 7439-B-07
Classification: **Description:** Drywall, Tape, Mud/ South Side
Results: A: Non-Asbestos: Non-Fibrous White Joint Compound
B: Non-Asbestos: 1% Cellulose Fibers in Brown Paperbacking
C: Non-Asbestos: Non-Fibrous White Drywall

Analysis Number: 158125-8
Customer Number: 7439-B-08
Classification: **Description:** Drywall, Tape, Mud/ South Side
Results: A: Non-Asbestos: Non-Fibrous White Joint Compound
B: Non-Asbestos: 1% Cellulose Fibers in Brown Paperbacking
C: Non-Asbestos: Non-Fibrous White Drywall

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APPROVED BY: 
LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY: 
Michelle Lavalée



H.M. Pitt Labs, Inc.

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Company:

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Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-9

Customer Number: 7439-B-09

Classification:

Description: Drywall, Tape, Mud/ South Side

Results:
A: Non-Asbestos: Non-Fibrous White Joint Compound
B: Non-Asbestos: 1% Cellulose Fibers in Brown Paperbacking
C: Non-Asbestos: Non-Fibrous White Drywall

Analysis Number: 158125-10

Customer Number: 7439-B-10

Classification:

Description: Beige Linoleum/ South Side

Results: Non-Asbestos: 10% Cellulose Fibers in Beige Sheet Vinyl

Analysis Number: 158125-11

Customer Number: 7439-B-11

Classification:

Description: Beige Linoleum/ South Side

Results: Non-Asbestos: 10% Cellulose Fibers in Beige Sheet Vinyl

Analysis Number: 158125-12

Customer Number: 7439-B-12

Classification:

Description: Beige Linoleum/ North Side

Results: Non-Asbestos: 10% Cellulose Fibers in Beige Sheet Vinyl

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APPROVED BY:

LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee



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Department
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San Diego, CA 92123

Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Lab Notes: 72 HR TAT

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-13

Customer Number: 7439-B-13

Classification:

Description: Glue for sub floor stilts/ North Side

Results: Non-Asbestos: 1% Cellulose Fibers in Black Glue

Analysis Number: 158125-14

Customer Number: 7439-B-14

Classification:

Description: Glue for sub floor stilts/ North Side

Results: Non-Asbestos: 1% Cellulose Fibers in Black Glue

Analysis Number: 158125-15

Customer Number: 7439-B-15

Classification:

Description: Glue for sub floor stilts/ North Side

Results: Non-Asbestos: 1% Cellulose Fibers in Black Glue

Analysis Number: 158125-16

Customer Number: 7439-B-16

Classification:

Description: Ceiling Tile 2'x2'/ North Side

Results: Non-Asbestos: 40% Cellulose Fibers and 30% Mineral Wool in White/Gray Ceiling Tile

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APPROVED BY:

Leland S. Pitt

LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee

Michelle Lavallee



H.M. Pitt Labs, Inc.

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Lab Number: 158125-214640

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Company:

City of San Diego Environmental Services
Department
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San Diego, CA 92123

Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-17

Customer Number: 7439-B-17

Classification:

Description: Ceiling Tile 2'x2' North Side

Results: Non-Asbestos: 40% Cellulose Fibers and 30% Mineral Wool in White/Gray Ceiling Tile

Analysis Number: 158125-18

Customer Number: 7439-B-18

Classification:

Description: Ceiling Tile 2'x2' North Side

Results: Non-Asbestos: 40% Cellulose Fibers and 30% Mineral Wool in White/Gray Ceiling Tile

Analysis Number: 158125-19

Customer Number: 7439-B-19

Classification:

Description: Baseboard and Glue/ North Side

Results: Non-Asbestos: Non-Fibrous Brown/Yellow Cove Base Mastic

Analysis Number: 158125-20

Customer Number: 7439-B-20

Classification:

Description: Baseboard and Glue/ North Side

Results: Non-Asbestos: Non-Fibrous Brown/Yellow Cove Base Mastic

-
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APPROVED BY:

LELANO S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee



H.M. Pitt Labs, Inc.

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Lab Number: 158125-214640

Tel: 619-474-8548 · Fax: 858-412-3305

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City of San Diego Environmental Services
Department
9601 Ridgehaven Court, Suite 310
San Diego, CA 92123

Date Entered: 08/14/2017
Analyzed By: Edina Zakar

Date Analyzed: 08/15/17
Customer PO / Claim#:
Contract Number:

Job Site: Project No. 7439

Date Sampled **Who Sampled**
08/10/2017 Wm. Brad Blondet

Lab Notes: 72 HR TAT

POLARIZED LIGHT MICROSCOPY ANALYSIS REPORT - EPA-600/R-93/116 AND EPA-600/M4-82-020

Analysis Number: 158125-21

Customer Number: 7439-B-21

Classification:

Description: Baseboard and Glue/ North Side

Results: Non-Asbestos: Non-Fibrous Brown/Yellow Cove Base Mastic

Analysis Number: 158125-22

Customer Number: 7439-B-22

Classification:

Description: Stucco/ Exterior

Results: A: Non-Asbestos: Non-Fibrous White Color Coat
B: Non-Asbestos: Non-Fibrous Gray Stucco

Analysis Number: 158125-23

Customer Number: 7439-B-23

Classification:

Description: Stucco/ Exterior

Results: A: Non-Asbestos: Non-Fibrous White Color Coat
B: Non-Asbestos: Non-Fibrous Gray Stucco

Analysis Number: 158125-24

Customer Number: 7439-B-24

Classification:

Description: Stucco/ Exterior

Results: A: Non-Asbestos: Non-Fibrous White Color Coat
B: Non-Asbestos: Non-Fibrous Gray Stucco

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APPROVED BY:

LELAND S. PITT, CIH

Dated: 08/15/2017

REVIEWED BY:

Michelle Lavallee

158125

Project # 7439 Submitted by: Wm. Brad Blondet Date: 8 / 10 / 2017 Page 1 of 3

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME:
 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER: _____

The receiving Laboratory is required to complete the following:

1. All invoices are to be sent to: Attn. City of San Diego - Environmental Services Department, 9601 Ridgehaven Court, Suite 310 San Diego, CA 92123
2. Lab reports/invoices are to contain the Project Number listed above. Do not include Purchase Order Numbers on invoices
3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/ Area	Analyses Requested
	7439-B-01	Penetration Mastics/ Patch	Bulk				PLM
	7439-B-02	Penetration Mastics/ Curb	Bulk				PLM
	7439-B-03	Penetration Mastics/ Seam	Bulk				PLM
	7439-B-04	Drywall Panel/ North side	Bulk				PLM
	7439-B-05	Drywall Panel/ North side	Bulk				PLM
	7439-B-06	Drywall Panel/ North side	Bulk				PLM
	7439-B-07	Drywall, tape, mud/ South side	Bulk				PLM
	7439-B-08	Drywall, tape, mud/ South side	Bulk				PLM
	7439-B-09	Drywall, tape, mud/ South side	Bulk				PLM

NOTES:

Relinquished by: William S. Dine Date/Time: 8/14/17 11:30

Received by: W. Pitt Date/Time: 8/14/17 11:30

Relinquished by: W. Pitt Date/Time: 8/14/17 14:30

Received by: W. Pitt Date/Time: 8/14/17 14:30

158125

Project # 7439 Submitted by: Wm. Brad Blondet Date: 8 / 10 / 2017 Page 2 of 3

LAB SUBMITTED TO: H.M. Pitt Labs

TURNAROUND TIME:
 2 HOUR 24 HOUR 48 HOUR 72 HOUR 5 DAY OTHER: _____

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3. Email report to: WBlondet@sandiego.gov

Lab Number	Sample No.	Material/Location	Media	Time On/Off or Size	Flow (LPM)	Volume/Area	Analyses Requested
	7439-B-10	Beige linoleum/ South side	Bulk				PLM
	7439-B-11	Beige linoleum/ South side	Bulk				PLM
	7439-B-12	Beige linoleum/ North side	Bulk				PLM
	7439-B-13	Glue for sub floor stilts/ North side	Bulk				PLM
	7439-B-14	Glue for sub floor stilts/ North side	Bulk				PLM
	7439-B-15	Glue for sub floor stilts/ North side	Bulk				PLM
	7439-B-16	Ceiling Tile 2' x 2'/ North side	Bulk				PLM
	7439-B-17	Ceiling Tile 2' x 2'/ North side	Bulk				PLM
	7439-B-18	Ceiling Tile 2' x 2'/ South side	Bulk				PLM

NOTES:

Relinquished by: *William S. Smith*
 Date/Time: 8 / 14 / 2017

Received by: *duffy*
 Date/Time: 8/14/17 @ 1:30

Relinquished by: *duffy*
 Date/Time: 8/14/17 @ 1:30

Received by: *James*
 Date/Time: 8/14/17 14:30

Reading No	Time	Duration	Sequence	Mode	Facility	Room	Side	Component	Condition	Substrate	Color	Results	PbC	Units
1	8/10/2017 11:28	325.8	Final										1	cps
2	8/10/2017 11:40	20	Final	K & L				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
3	8/10/2017 11:41	20	Final	K & L				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
4	8/10/2017 11:43	20	Final	K & L				CALIB. CHECK			RED	Negative	0.9	mg / cm ^2
5	8/10/2017 11:47	1.1	Final	Std.	FAA FLIGHT OP	NORTH ENTRY	A	DF	INTACT	METAL	BROWN	Negative	0.05	mg / cm ^2
6	8/10/2017 11:47	1.11	Final	Std.	FAA FLIGHT OP	NORTH ENTRY	A	DF	INTACT	METAL	BROWN	Negative	0	mg / cm ^2
7	8/10/2017 11:48	1.11	Final	Std.	FAA FLIGHT OP	NORTH ENTRY	A	D	INTACT	METAL	BROWN	Negative	0	mg / cm ^2
8	8/10/2017 11:49	1.6	Final	Std.	FAA FLIGHT OP	INTERIOR	A	WALL	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
9	8/10/2017 11:49	1.59	Final	Std.	FAA FLIGHT OP	INTERIOR	B	WALL	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
10	8/10/2017 11:50	3.07	Final	Std.	FAA FLIGHT OP	INTERIOR	B	WALL	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
11	8/10/2017 11:50	0.86	Final	Std.	FAA FLIGHT OP	ENTRY LOBBY	A	TILE FLOOR	INTACT	CERAMIC	BEIGE	Positive	2.2	mg / cm ^2
12	8/10/2017 11:50	0.86	Final	Std.	FAA FLIGHT OP	BREAK ROOM	A	TILE FLOOR	INTACT	CERAMIC	WHITE	Positive	2.1	mg / cm ^2
13	8/10/2017 11:51	1.1	Final	Std.	FAA FLIGHT OP	BREAK ROOM	A	COUNTER	INTACT	DRYWALL	WHITE	Negative	0.5	mg / cm ^2
14	8/10/2017 11:52	1.1	Final	Std.	FAA FLIGHT OP	BATH HALL	A	FLOOR TILE	INTACT	CERAMIC	BLUE	Positive	1.9	mg / cm ^2
15	8/10/2017 11:52	1.71	Final	Std.	FAA FLIGHT OP	RR	A	FLOOR TILE	INTACT	DRYWALL	WHITE	Negative	0	mg / cm ^2
16	8/10/2017 11:53	0.25	Final	Std.	FAA FLIGHT OP	N ENTRY	A	FLOOR TILE	INTACT	CERAMIC	BEIGE	Positive	8.6	mg / cm ^2
17	8/10/2017 11:53	1.23	Final	Std.	FAA FLIGHT OP	RR	A	WALL TILE	INTACT	DRYWALL	WHITE	Negative	0.4	mg / cm ^2
18	8/10/2017 11:54	1.1	Final	Std.	FAA FLIGHT OP	RR	A	WALL TILE	INTACT	DRYWALL	WHITE	Negative	0.29	mg / cm ^2
19	8/10/2017 11:57	3.19	Final	Std.	FAA FLIGHT OP	EXT	A	WALL	INTACT	STUCCO	WHITE	Negative	0	mg / cm ^2
20	8/10/2017 11:58	3.18	Final	Std.	FAA FLIGHT OP	EXT	D	WALL	INTACT	STUCCO	WHITE	Negative	0	mg / cm ^2
21	8/10/2017 11:59	1.11	Final	Std.	FAA FLIGHT OP	EXT	D	DOWNSPOUT	POOR	METAL	WHITE	Negative	0	mg / cm ^2
22	8/10/2017 12:00	1.1	Final	Std.	FAA FLIGHT OP	EXT	A	DOOR	POOR	METAL	BROWN	Negative	0	mg / cm ^2
23	8/10/17 12:03	20	Final	K & L				CALIB. CHECK			RED	Positive	1.1	mg / cm ^2
24	8/10/17 12:04	20	Final	K & L				CALIB. CHECK			RED	Positive	1	mg / cm ^2
25	8/10/17 12:08	20	Final	K & L				CALIB. CHECK			RED	Positive	1	mg / cm ^2
26	8/10/17 12:10	20	Final	K & L				CALIB. CHECK			RED	Positive	1	mg / cm ^2

APPENDIX J

ASBESTOS ABATEMENT SPECIFICATION



Environmental Services Department

Disposal & Environmental Protection

ASBESTOS ABATEMENT SPECIFICATION

for

Montgomery Field Fire Rescue Air Operation Facility

CLEARANCE ACTIVITY

October 19, 2017

Prepared by:

A handwritten signature in black ink, appearing to read "William B. Blondet", written over a horizontal line.

William Blondet

Asbestos & Lead Program Inspector

CA Asbestos SST #99-2689

Reviewed by:

A handwritten signature in black ink, appearing to read "George Katsikaris", written over a horizontal line.

George Katsikaris

Asbestos & Lead Program Manager

CA Asbestos Consultant #07-4265

City of San Diego
Environmental Services Department
Disposal & Environmental Protection
Asbestos & Lead Management Program
9601 Ridgehaven Court, Ste 320
San Diego, CA 92123
Tel: (858) 492-5086
Fax: (858) 492-5089

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I. GENERAL REQUIREMENTS

A. DESCRIPTION OF WORK

Scope of Work: Removal of roofing patch mastics

1. ABATEMENT CONTRACTOR shall supply all labor, transportation, material, apparatus, and equipment for the removal, and disposal of asbestos-containing materials (ACM) to be impacted as a result of this project, as identified in Appendix C of this section.
2. ABATEMENT CONTRACTOR shall be responsible for ensuring the building will not be contaminated with asbestos containing material during work and shall be responsible for any clean-up determined necessary by City of San Diego's PROJECT MONITOR.
3. Before submitting his/her bid, the ABATEMENT CONTRACTOR shall visit the project site and verify the location of the asbestos-containing materials that will be removed under the terms and conditions of the contract and this specification.
4. Abatement work shall be performed within agreed upon hours submitted prior to project start which will not include designated City holidays.
5. Before the beginning of the work related to asbestos abatement, ABATEMENT CONTRACTOR shall hold a safety construction meeting with all asbestos related supervisors, workers, and other contractors on-site that provides an overview of the accepted asbestos work plan, decontamination procedures specific to this project (decontamination procedures shall be on paper with copies for all present), and disposal plan for this project. Meeting shall include the PROJECT MONITOR and any other designated City representative.

B. CONTRACTOR USE OF THE PREMISES

1. All site rules and regulations affecting the work should be complied with while engaged in project activities. The existing building should be maintained in a safe condition throughout the asbestos abatement activities. The ABATEMENT CONTRACTOR will be responsible for adhering to all applicable building codes and fire safety requirements.
2. All public areas will be kept free of accumulated waste, materials, rubbish, and debris.

C. PROJECT COORDINATION

1. It will be the responsibility of the ABATEMENT CONTRACTOR to coordinate all site activities with the City's Asbestos & Lead Management Program's (ALMP) PROJECT MONITOR including any meetings, surveys, special reports, and site usage limitations.

D. PROJECT SUBMITTALS

The ABATEMENT CONTRACTOR shall not commence any work until approval has been given from the City. The ABATEMENT CONTRACTOR shall submit the following at least 60 days prior to commencement of any asbestos abatement activities:

1. Asbestos Abatement Work Plan:
 - a) In addition to information required in this section, Work Plan shall contain all information required under Title 8 CCR 1529. Submit a detailed job-specific plan that includes:
 - (1) The procedures proposed to comply with the requirements of this specification and all applicable regulations.
 - (2) Detailed drawings that identify the location, size, layout and details of the Work Areas, any equipment, disposal storage, restrooms, and worker decontamination facilities.
 - (3) The sequencing of abatement work and the interface of trades involved in the performance of work. Provide a time line that details each major phase of work activity and anticipated time it will occur.
 - (4) The methods to be used to assure the safety of occupants and visitors to the site.
 - (5) Detailed description of the methods to be employed to ensure asbestos is not released above background air levels.
 - (6) The method of removal to minimize asbestos dust generation in the Work Area,
 - b) Work site coordination submittals including:
 - (1) Contingency and Spill Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, or any other event that may require modification or abridgement of decontamination or Work Area isolation procedures. Include in plan specific procedures for decontamination or Work Area isolation. Plan should be specific for all types of hazardous materials or situations specific to this work site. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.
 - (2) Telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.
2. Notifications:
 - a) If required by regulations, submit copies of notifications made to regulatory agencies along with a copy of certified mail receipt.
 - b) Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering Work Area,

emergency entry and exit locations, modifications to fire notification or fire-fighting equipment, and other information needed by agencies providing emergency services.

c) Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this contract or the Contract Sum.

d) Provide submittal identifying person responsible for responding to project site emergencies twenty-four hours a day, seven days a week.

3. ABATEMENT CONTRACTOR qualifications and personnel information submittals that include but are not limited to:

a) Submit a copy of the ABATEMENT CONTRACTOR's Asbestos DOSH Handling License.

b) Identify state licensed transporter, disposal location, and associated permits for all asbestos waste.

c) Provide all staff names, certifications, and experience. Identify their duties and responsibilities on this project. ABATEMENT CONTRACTOR shall have the following minimum levels of qualified supervision on the project site:

(1) General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the ABATEMENT CONTRACTOR's representative responsible for compliance with all applicable federal, state and local regulations and guidelines, particularly those relating to asbestos abatement and hazardous waste. Should, in the opinion of the OWNER, any language barrier exist between the on-site superintendent and the OWNER or PROJECT MONITOR, the ABATEMENT CONTRACTOR shall employ a qualified full-time interpreter or provide a new on-site superintendent at no additional cost to the OWNER. Shall be AHERA certified as asbestos supervisor.

(2) Foreman: Provide a full time Foreman to directly supervise and direct no more than 10 abatement workers. Each Foreman will act as the Competent Person as required by Title 8 CCR 1529 for the workers the foreman is directing. The Foreman has oversight authority over the workers and reports to the General Superintendent. If there are 10 or fewer abatement workers on the project the General Superintendent may fill the Foreman's position. Shall be AHERA certified as asbestos supervisor.

(3) Experience and Training: The General Superintendent and foreman shall meet all the requirements as a Competent Person as required by Title 8 CCR 1529. They shall have completed training in

EPA Asbestos Supervisor Training. They shall have experience with projects of similar types and sizes.

(4) Workers: All asbestos abatement workers shall have current EPA and OSHA asbestos abatement training.

(5) Certificate of Worker's Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found in Appendix A of this section, for each worker and supervisor who is to be at the job site or enter the Work Area.

d) Submit respiratory protection information and air monitoring data as per the following:

(1) Operating Instruction: Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.

(2) Respiratory Protection Program: Submit ABATEMENT CONTRACTOR's written respiratory protection program manual as required by Title 8 CCR 1529 and 5144.

(3) Respiratory Protection Schedule: Submit level of respiratory protection intended for each operation required by the project.

(4) Copies of current respirator fit test: Fit tests must be performed every 6 months.

e) Submit doctor's report from medical examination conducted within the last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, the following for each worker:

(1) Name and Social Security Number

(2) Physicians Written Opinion from examining physician including at a minimum the following:

(a) Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to asbestos. Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.

(b) Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.

f) Submit a notarized certification, signed by an officer of the ABATEMENT CONTRACTOR firm that exposure measurements, medical surveillance, and worker training records are being kept in conformance with Title 8 CCR 1529.

- g) Identify the laboratory that will be performing the analysis of the personal samples and provide their accreditation. Also discuss the method by which the ABATEMENT CONTRACTOR will provide the analytical results to the PROJECT MONITOR within 24 hours of sampling completion.
- 4. Submit the following during and at the completion of the work
 - a) Copies of all Waste Shipment Records
 - b) Copies of all air monitoring results within 24 hours
- 5. At the end of a project, the ABATEMENT CONTRACTOR shall submit the following to the PROJECT MONITOR:
 - a) Personal Air Sample Results
 - b) Copies of Project Daily Logs
 - c) Containment Entry/Exit Logs
 - d) Waste Disposal Documentation
 - e) Certificate of Visual Inspection

E. SCHEDULES AND REPORTS

- 1. Prior to each phase of project, the ABATEMENT CONTRACTOR shall provide the City with a tentative time line which outlines the project schedule. These documents will be reviewed and approved by the City prior to the commencement of work.

F. PRODUCT DATA

- 1. The ABATEMENT CONTRACTOR shall submit product information that is to be used during the abatement activities prior to commencement of work (i.e., encapsulants). General information required includes manufacturer's standard printed recommendations for application and use, compliance with recognized standards of trade association and testing agencies, and safety data sheets (SDSs).
- 2. Polyethylene sheet
 - a) A single polyethylene film in the largest sheet size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and clear, frosted, or black as indicated.
 - b) Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and frosted or black as indicated.
 - c) Reinforced Polyethylene Sheet: Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles

and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, frosted or black as indicated.

3. Tape
 - a) Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
4. Spray adhesive
 - a) Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

G. PROJECT CLOSE-OUT

1. Upon completion of work and prior to payment, the PROJECT MONITOR will proceed with an initial inspection of the abatement work area. A Certificate of Visual Inspection (Appendix B) will be signed by both the ABATEMENT CONTRACTOR and PROJECT MONITOR. The ABATEMENT CONTRACTOR will not be paid until the area meets the established project-specific clearance criteria and has submitted the required information.

II. DEFINITIONS

- A. ABATEMENT: Any set of measures designed to permanently eliminate lead based paint hazards including paint removal, building component removal, or near-permanent enclosure of lead based paint hazards.
- B. ABATEMENT CONTRACTOR: The designated sub-contractor performing the required abatement work outlined in this specification.
- C. ACCREDITED or ACCREDITATION (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).
- D. AIR MONITORING: The process of measuring the fiber content of a specific volume of air.
- E. AMENDED WATER: Water to which a surfactant has been added to decrease the surface tension to 35 or less dynes.
- F. ASBESTOS: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite grunerite, anthophyllite, and actinolite tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
- G. ASBESTOS CONTAINING MATERIAL (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.

- H. ASBESTOS-CONTAINING BUILDING MATERIAL (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.
- I. ASBESTOS CONTAINING WASTE MATERIAL: Any material which is or is suspected of being or any material contaminated with an asbestos containing material which is to be removed from a work area for disposal.
- J. ASBESTOS DEBRIS: Pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.
- K. AUTHORIZED VISITOR: The Owner, the Owner's Representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
- L. BARRIER: Any surface that seals off the work area to inhibit the movement of fibers.
- M. BREATHING ZONE: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- N. DEMOLITION: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- O. DISPOSAL BAG: A properly labeled 6 mil thick leak tight plastic bags used for transporting asbestos waste from work and to disposal site.
- P. ENCAPSULANT: A penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos containing materials rather than for in situ encapsulation.
- Q. ENCAPSULATION: Treatment of asbestos containing materials, with an encapsulant.
- R. ENCLOSURE: The construction of an air tight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.
- S. FILTER: A media component used in respirators to remove solid or liquid particles from the inspired air.
- T. FRIABLE ASBESTOS MATERIAL: Material that contains more than 1.0% asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. A material can also be rendered friable via mechanical means.
- U. HEPA FILTER: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.

- V. HEPA FILTER VACUUM COLLECTION EQUIPMENT (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.
- W. NEGATIVE PRESSURE RESPIRATOR: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- X. PERSONAL MONITORING: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
- Y. PROTECTION FACTOR: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- Z. PROJECT MONITOR: City of San Diego Asbestos & Lead Management Program staff or their designated consultant.
- AA. VISIBLE EMISSIONS: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- BB. WET CLEANING: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.
- CC. WORK AREA: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by Title 8 CCR 1529

III. SITE WORK

- A. INTRODUCTION
This portion of the specification describes procedures and protocols for asbestos abatement activities. The protocols/procedures described hereafter are in accordance with federal/state/local requirements. In the absence of these requirements, the procedure/protocols are based on current industry standards.

B. BACKGROUND INFORMATION

Sampling of building materials has been performed by inspectors from the City's Asbestos and Lead Management Program (ALMP) and has been provided in Appendix C of this specification.

C. GENERAL INFORMATION

1. Potential Asbestos Hazard

The disturbance of asbestos containing materials may cause exposure to workers and building occupants. All workers, supervisory personnel, subcontractors, and consultants who will be at the job site, need to be apprised of the seriousness of the hazard and of proper work practices which must be followed to minimize exposure. The procedures and methods described herein must be followed and the ABATEMENT CONTRACTOR must comply with all applicable federal/state/local requirements.

2. Stop Work

If the PROJECT MONITOR presents a verbal or written stop work order, the ABATEMENT CONTRACTOR shall immediately and automatically stop all work. Recommencement of the work may not begin until authorized by the PROJECT MONITOR.

D. PROJECT ADMINISTRATION

1. Certified Supervisor

The ABATEMENT CONTRACTOR needs to provide a full-time asbestos abatement supervisor who is experienced in administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc. This supervisor must have completed an "Asbestos Abatement Supervision" course. This person will act as the competent person on the job.

In addition, all employees working on the project must have taken an "Asbestos Abatement Worker" course.

E. SPECIAL REPORTS

1. Reporting Unusual Events

When an event of unusual and significant nature occurs at the site (e.g., a spill of asbestos debris, failure of special equipment used to contain asbestos), the ABATEMENT CONTRACTOR shall prepare and submit a special report listing the chain of events, persons participating, response by ABATEMENT CONTRACTOR's personnel, evaluation of results, and other pertinent information.

2. Reporting Accidents

The ABATEMENT CONTRACTOR shall prepare and submit reports of significant accidents at the subject site. Pertinent data and actions need to be recorded. In addition, response actions should comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury or property

loss of substance is sustained, or where the event posed a significant threat of loss or personal injury or potential environmental contamination.

F. COMPLIANCE WITH CODES AND REGULATIONS

1. Except to the extent that more explicit, or more stringent requirements are written directly into this Asbestos Abatement Contract/Specification, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

2. The ABATEMENT CONTRACTOR will assume full responsibility and liability for the compliance with all applicable federal/state/local regulations pertaining to work practices, protection of workers, and visitors to the site, persons occupying areas adjacent to the site, hauling, and disposal of waste. The ABATEMENT CONTRACTOR shall hold the City and its representative harmless for the ABATEMENT CONTRACTOR's failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of itself, its employees, or its sub ABATEMENT CONTRACTORS.

3. State requirements which govern asbestos abatement activities or hauling and disposal of hazardous waste include, but are not limited to, the following:

a) As required, ABATEMENT CONTRACTOR shall notify all Local, State, and Federal agencies regulating standards for the removal of asbestos-containing materials, including but not limited to: Cal-OSHA, San Diego Air Pollution Control District, and U.S. Environmental Protection Agency. ABATEMENT CONTRACTOR shall provide Owner a copy of each notification and a copy of a certified mail receipt proving proper notification to all required agencies.

b) ABATEMENT CONTRACTOR shall be registered as an asbestos contractor before performing any asbestos related work; a licensee must also be registered with the Department of Industrial Relations, Division of Occupational Safety and Health.

c) Transportation of hazardous materials shall be in accordance with the State of California Title 22 and the Department of Transportation regulations.

d) ABATEMENT CONTRACTOR shall comply with all provisions of California Title 8, Section 5208 and Section 1529.

e) ABATEMENT CONTRACTOR shall be in compliance with all provisions of Title 40 CFR Part 61.

f) ABATEMENT CONTRACTOR shall assume full responsibility and liability for compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to site, and persons occupying areas adjacent to the site.

G. PERMITS AND LICENSES

The ABATEMENT CONTRACTOR shall submit to the City in the bid submittal any permits or licenses necessary to carry out this work.

1. Permits

A valid Hazardous Waste Hauler registration is required for transporting any hazardous waste. Certain types of equipment require APCD permits (e.g., abrasive blasters).

2. Licenses

The ABATEMENT CONTRACTOR must be certified by the California Contractors State License Board. The ABATEMENT CONTRACTOR, or its subcontractor, shall have current licenses, as required by all applicable state or local jurisdictions for the removal, transportation, disposal, or other regulated activity relative to the work described in this plan.

H. HEALTH AND SAFETY

This section describes the equipment and procedures required for protecting workers from asbestos contamination and other workplace hazards.

1. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work.

2. Training

a) All workers are to be trained, certified and accredited as required by state or local code or regulation.

b) Train all workers, in accordance with Title 8 CCR section 5208 and section 1529, regarding the dangers inherent in handling asbestos and breathing asbestos dust, proper work procedures, and personal and area protective measures.

c) Provide medical examinations for all workers who may encounter an airborne fiber level of 0.1 fibers/cc or greater for an 8 hour Time Weighted Average. In the absence of specific airborne fiber data, provide medical examinations for all workers who will enter the Work Area for any reason. Examination shall as a minimum meet requirements as set forth in Title 8 CCR 1529. In addition, provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.

3. Protective clothing

a) Coveralls: Provide disposable "full body" coveralls and disposable head covers, and require that they be worn at all times by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

b) Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with asbestos-containing material.

Thoroughly clean, decontaminate and bag boots before removing them from Work Area at the end of the work.

c) Hard Hats: Provide head protection (hard hats) as required by OSHA for all workers, and provide 1 spare for use by Owner's Representative, Project Administrator, and Owner. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of the type with plastic strap suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

d) Goggles: Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

e) Gloves: Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

4. Respirators

a) Air Purifying Respirators

(1) Respirator Bodies: Provide half face or full face type respirators based upon appropriate protection factor as determined by the ABATEMENT CONTRACTORS competent person. .

(2) Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

(3) Non permitted respirators: Do not use single use, disposable or quarter face respirators.

(4) Require that respiratory protection be used at all times when there is any possibility of disturbance of asbestos containing materials whether intentional or accidental.

(5) Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re occupancy.

(6) Regardless of Airborne Fiber Levels: Require that the minimum level of respiratory protection used be a half-face air purifying respirators with high efficiency filters.

b) Fit testing

- (1) Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection course of training. Only allow an individual to use respirators for which training and fit testing has been provided.
 - (2) Upon Each Wearing: Require that each time an air purifying respirator is put on it be checked for fit with a positive and negative pressure fit check in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).
 - c) Respirators, disposable coveralls, head covers, and foot covers shall be provided by the ABATEMENT CONTRACTOR for the City of San Diego's Asbestos and Lead Management Program's PROJECT MONITOR, and other authorized representatives who may inspect the job site. Provide two (2) respirators and six (6) complete coveralls and, where applicable, six (6) respirator filter changes per day.
5. Materials and Equipment
 - a) Only material and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards, may be used.
 6. Water Service
 - a) The ABATEMENT CONTRACTOR will be able to obtain water services from on-site facilities. The City will designate the facilities from which water service may be obtained.
 7. Electrical Services
 - a) The ABATEMENT CONTRACTOR will be able to obtain electrical services from on-site facilities. The City will designate the facilities from which electrical services may be obtained. The ABATEMENT CONTRACTOR shall provide their own electrical hook-ups, i.e. spider boxes, ground fault circuit interrupter (GFCI) etc. and installed by a licensed electrician.
 - b) The electrical services need to comply with the applicable NEMA, NECA, and UL standards, and governing regulations for materials and lay-out of temporary electrical services.
 8. Sanitary Facilities
 - a) The ABATEMENT CONTRACTOR shall provide sanitary facilities on site, if none have been made available by the City.
 9. Fire Extinguisher
 - a) Applicable recommendations of the National Fire Protection Association (NFPA) Standard 10, "Standard for Portable Fire Extinguishers," must be complied with by the ABATEMENT CONTRACTOR. Fire extinguishers need to be located where they are most convenient and effective for their intended purpose, but not less than one (1) extinguisher in each work area, the equipment room, outside/work areas, and in the clean room.
 10. First Aid

- a) The ABATEMENT CONTRACTOR will need to provide first aid supplies which should comply with the governing regulations and recognized recommendations within the construction industry.

I. WORK AREA PROCEDURES

1. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area.
2. ABATEMENT CONTRACTOR shall secure work area from access by public, staff or users of the area. Accomplish this where possible, by locking doors, gates, or other means of access to the area.
3. Barricade fencing is required for securing an outside area from unauthorized access. Work area delineation shall occur at no less than twelve feet (12') from the radius of the work and/or building. Yellow caution tape shall not be used.
4. All windows, vents, mechanical systems, etc., in close proximity to the abatement area shall be sealed with plastic and tape by the ABATEMENT CONTRACTOR prior to the work beginning.
5. Provide warning signs at entry to work area in accordance with California Title 8, Section 1529.
6. A visitor entry and exit-log, and an employee daily sign-in log shall be maintained throughout the asbestos abatement activities. The ABATEMENT CONTRACTOR shall be responsible for the project site security during the operations in order to protect work efforts and equipment.

J. REMOVAL OF ASBESTOS-CONTAINING MATERIALS

1. Asbestos-containing materials shall be adequately wetted with either amended water or a removal encapsulant before and during removal process, to reduce fiber emission.
2. The ABATEMENT CONTRACTOR should exercise caution in using water, as he will be solely responsible for any water damage to the facility resulting from the work.
3. ABATEMENT CONTRACTOR is responsible for keeping all asbestos containing debris within the containment area at all times throughout removal. Any interior contamination, if created, is the responsibility of the ABATEMENT CONTRACTOR to clean at no additional cost to the City.
4. ABATEMENT CONTRACTOR shall ensure there is no loose debris around the Work Area during the removal and if found, ABATEMENT CONTRACTOR shall clean the area immediately.

K. DISPOSAL

1. Both non-friable and friable ACM shall be containerized immediately, secured in a locked container, be transported by state licensed hauler with manifest, and disposed of at appropriate landfill location.

2. The PROJECT MONITOR or designated representative will inspect each load and sign all waste manifests before waste leaves the site.
3. Copies of Waste Shipment Records for each load of asbestos waste material shall be given to the City.
4. Cordon off the Work Area, a safe zone around the building, and the dumpster area with barrier fencing. Yellow caution tape shall not be used.
5. Provide warning signs at Work Area access in accordance with Title 8 CCR 1529

L. DECONTAMINATION PROCEDURE

1. Prior to leaving the Work Area, HEPA vacuum outer suit completely and remove, turning it inside out while doing so.
2. Hygiene facilities such as change rooms and showers are not required to be adjacent to the operations on top of Work Areas on top of a roof, but these facilities must be provided [Title 8, Section 1529 (1)(3)]. Proceed to decontamination area where the second suit is to be removed while turning it inside out.
3. After wiping all areas and respirator, remove respirator and wipe facial area clean.
4. Place contaminated suits, towels, and respirator cartridges in a properly labeled asbestos waste bag.
5. At the completion of the project, boots, hard hats, and goggles should be decontaminated and bagged prior to removal from the Work Area.
6. Equipment leaving the Work Area should be HEPA vacuumed and wet wiped.

M. AIR MONITORING/WORK AREA CLEARANCE

1. The City's PROJECT MONITOR will provide ambient area air monitoring during all phases of the removal of asbestos-containing materials, including the interior and/or exterior of the facility.
2. During the project, personal air monitoring will be conducted by ABATEMENT CONTRACTOR to determine fiber levels. If fiber levels exceed 0.05 fibers/cc then work shall cease and not begin again until after PROJECT MONITOR approves the ABATEMENT CONTRACTOR's revised methodology which will lower fiber levels. Procedures shall be submitted in writing to the City prior to implementing these procedures. At a minimum, ABATEMENT CONTRACTOR shall provide air monitoring for every four workers. Testing of air samples will be by Phase Contrast Microscopy following NIOSH 7400 rules.
3. If any of the ambient area samples taken by the PROJECT MONITOR either inside or outside exceed .01 fibers/cc then ABATEMENT CONTRACTOR is required to pay for the additional testing on those samples collected using transmission electron microscopy (TEM).
4. Release of the ABATEMENT CONTRACTOR from the asbestos-containing material removal phase of the contract will be determined by the PROJECT MONITOR based upon the results of visual inspection and/or clearance air sampling.

N. TRANSPORTATION AND DISPOSAL

1. Any packaging used to ship hazardous waste off site such as a container, roll-off bin, tank or other device, must comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with Title 22 CCR Article 3. The hazardous waste label must be affixed and filled out when the first amount of hazardous waste is placed in the container. The label must include the initial accumulation date.
2. All additional pre-transportation labeling, marking or placarding must be conducted prior to transporting off site and in accordance with Title 22 CCR Chapter 12, Article 3.
3. All containers and tanks of hazardous waste must be managed in a way which minimizes the threat of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil or surface water which could threaten human health or the environment. Management techniques include containment areas capable of holding the contents of largest container within the containment area. Properly store and secure waste at all times. Do not leave hazardous waste in uncovered or unlocked trucks or dumpsters.
4. A hazardous waste manifest will be completed in accordance with Title 22 CCR Chapter 12, Article 2 for each shipment of hazardous waste leaving the work site. All waste shall leave the project site by the end of the project. Only The PROJECT MONITOR shall sign as the generator on manifests.

APPENDIX A

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

CONTRACTOR'S NAME: _____

Working with asbestos can be dangerous. Inhaling asbestos fibers has been linked with various types of cancer. If you smoke and inhale asbestos fibers the chance that you will develop lung cancer is greater than that of the non-smoking public.

Your employer's contract with the City for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. The topics covered in the course must have included the following:

- Physical characteristics of asbestos
- Health hazards associated with asbestos
- Respiratory protection
- Use of protective equipment
- Pressure Differential Systems
- Work practices including hands on or on job training
- Personal decontamination procedures
- Air monitoring, personal and area

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x ray.

By signing this document you are acknowledging only that the City has advised you of your rights to training and protection relative to your employer, the ABATEMENT CONTRACTOR.

Signature: _____ Social Security No.: _____

Printed Name: _____

Witness (print): _____ Witness Signature: _____

APPENDIX B
CERTIFICATION OF VISUAL INSPECTION

Project # _____ Date: _____ Location: _____

Contractor: _____

The contractor hereby certifies that he/she has visually inspected the Work Area (all surfaces including pipes, counters, ledges, walls, ceiling and floor, behind critical barriers, sheet plastic, etc.) and has found no dust, debris or residue.

By: (Signature): _____ Date: _____

(Print Name): _____

(Company Name): _____

(Print Title): _____

CITY ALMP REPRESENTATIVE

The City ALMP Representative hereby certifies that he has accompanied the contractor on his/her visual inspection and verifies that this inspection has been thorough and to the best of his/her knowledge and belief, the contractor's certification above is a true and honest one.

By: (Signature): _____ Date: _____

(Print Name): _____

WORK AREA

Location: _____

Room: _____

Hazard Reduction Performed:

APPENDIX C

SUMMARY OF ASBESTOS RESULTS

Sample #	Material	Location	Condition	Asbestos (%)
7439-B-01	Roof Patch Mastics	Roof	Intact	5% Chrysotile

APPENDIX K

LEAD RELATED CONSTRUCTION SPECIFICATION



Environmental Services Department
Disposal & Environmental Protection

LEAD RELATED CONSTRUCTION
SPECIFICATION
for
Montgomery Field Fire Rescue Air Operations Facility
October 19, 2017

Prepared by:

Wm. Brad Blondet

Asbestos & Lead Program Inspector

CDPH IA/PM/S License# 5464

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Environmental Services Department
Disposal & Environmental Protection
Asbestos & Lead Management Program
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I. GENERAL REQUIREMENTS

A. DESCRIPTION OF WORK

Scope of Work: Lead safe work practices and containment of lead dust during ceramic tile removal.

1. CONTRACTOR shall supply all labor, transportation, material, apparatus, and equipment for the removal, and disposal of lead containing materials to be impacted as a result of this project.
2. CONTRACTOR must use lead safe work practices on all surfaces containing lead in the paint in excess of 0.5mg/cm² or 1,000mg/kg as identified in Appendix C of this section.
3. CONTRACTOR shall be responsible for ensuring the surrounding areas will not be contaminated with lead containing materials during work and shall be responsible for any clean-up determined necessary by City of San Diego's PROJECT MONITOR.
4. Before submission of bids the CONTRACTOR shall visit the project site and verify the location and quantities of the lead containing materials that will be removed under the terms and conditions of this specification.
5. All paint chips collected must be stored in sealable drum containers (not in bags). Paint chips will be considered as hazardous waste.
6. Work shall be performed within agreed upon hours submitted prior to project start which will not include designated City holidays.
7. Before the beginning of work the CONTRACTOR shall hold a safety construction meeting with all supervisors, workers, and other contractors on-site that provides an overview of the accepted work plan, decontamination procedures specific to this project (decontamination procedures shall be on paper with copies for all present), and disposal plan for this project. Meeting shall include the PROJECT MONITOR and any other designated City representative.
8. Construction debris shall be profiled before leaving the jobsite. The CONTRACTOR shall perform the profile testing of the construction debris.

B. CONTRACTOR USE OF THE PREMISES

1. All site rules and regulations affecting the work should be complied with while engaged in project activities. The existing building should be maintained in a safe condition throughout construction activities. The CONTRACTOR will be responsible for adhering to all applicable building codes and fire safety requirements.
2. All public areas will be kept free of accumulated waste, materials, rubbish, and debris.

C. PROJECT COORDINATION

1. It will be the responsibility of the CONTRACTOR to coordinate all site activities with the City's Asbestos & Lead Management Program's (ALMP) PROJECT MONITOR including any meetings, surveys, special reports, and site usage limitations.

D. PROJECT SUBMITTALS

The CONTRACTOR shall not commence any work until approval has been given from the PROJECT MONITOR. The CONTRACTOR shall submit the following at least 30 days prior to commencement of any construction activities:

1. Work Plan:

a) Submit a detailed job-specific plan that includes:

(1) The procedures proposed to comply with the requirements of this specification and all applicable regulations.

(2) Detailed drawings that identify the location, size, layout and details of the Work Areas, any equipment, disposal storage, restrooms, and worker decontamination facilities.

(3) The sequencing of work and the interface of trades involved in the performance of work. Provide a time line that details each major phase of work activity and anticipated time it will occur.

(4) The methods to be used to assure the safety of occupants and visitors to the site.

(5) A description of methods to be used to control dispersion of hazardous materials to the interior and exterior of the building.

(6) The method of removal to minimize dust generation in the Work Area.

b) Work site coordination submittals including:

(1) Contingency and Spill Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, or any other event that may require modification or abridgement of decontamination or Work Area isolation procedures. Include in plan specific procedures for decontamination or Work Area isolation. Plan should be specific for all types of hazardous materials or situations specific to this work site. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.

(2) Telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.

2. Notifications:

- a) Permits, notifications, and licenses needed to perform work (including hazardous waste hauler's registration)
 - b) Notify emergency service agencies including fire, ambulance, police or other agency that may service the work site in case of an emergency. Notification is to include methods of entering Work Area, emergency entry and exit locations, modifications to fire notification or fire-fighting equipment, and other information needed by agencies providing emergency services.
 - c) Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary without effect on this contract or the contract sum.
 - d) Provide submittal identifying person responsible for responding to project site emergencies twenty-four hours a day, seven days a week.
3. CONTRACTOR qualifications and personnel information submittals that include but are not limited to:
- a) Provide all staff names, certifications, and experience. Identify their duties and responsibilities on this project. CONTRACTOR shall have the following minimum levels of qualified supervision on the project site:
 - (1) General Superintendent: Provide a full-time General Superintendent who is experienced in administration and supervision of Lead Related Construction projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the CONTRACTOR's representative responsible for compliance with all applicable federal, state and local regulations and guidelines. Should, in the opinion of the OWNER, any language barrier exist between the on-site superintendent and the OWNER or PROJECT MONITOR, the CONTRACTOR shall employ a qualified full-time interpreter or provide a new on-site superintendent at no additional cost to the OWNER. Shall be EPA
 - (2) Foreman: Provide a full time Foreman to directly supervise and direct no more than 10 workers. Each Foreman will act as the Competent Person for the workers the foreman is directing. The Foreman has oversight authority over the workers and reports to the General Superintendent. If there are 10 or fewer workers on the project the General Superintendent may fill the Foreman's position.
 - (3) Experience and Training: The General Superintendent and Foreman must have attended an 8 hour EPA accredited Renovate, Repair, Painting Contractor training and possess a current certification as outlined in 40 CFR 745, Subpart E. They shall also have experience with projects of similar types and sizes.

- (4) Workers: All workers shall have attended a tailgate training as outlined in 40 CFR 745, Subpart E or have a signed proof of training onsite.
 - (5) Certificate of Worker's Acknowledgment: Submit an original signed copy of the Certificate of Worker's Acknowledgment found in Appendix A of this section, for each worker and supervisor who is to be at the job site or enter the Work Area.
- b) Identify state licensed transporter, disposal location, and associated permits for all hazardous waste.
 - c) Submit respiratory protection information and air monitoring data as per the following:
 - (1) Operating Instruction: Submit complete operating and maintenance instructions for all components and systems as a whole. Submittal is to be in bound manual form suitable for field use.
 - (2) Respiratory Protection Program: Submit CONTRACTOR's written respiratory protection program manual as required by 8 CCR 1531 and 5144.
 - (3) Respiratory Protection Schedule: Submit level of respiratory protection intended for each operation required by the project.
 - (4) Copies of current respirator fit test: Fit tests must be performed every 6 months.
 - d) Submit doctor's report from medical examination conducted within the last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area. Submit, at a minimum, the following for each worker:
 - (1) Name and Social Security Number
 - (2) Copies of Blood Lead Levels and Zinc Protoporphyrin tests
 - (3) Physicians Written Opinion from examining physician including at a minimum the following:
 - (a) Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to lead. Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.
 - (b) Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from lead exposure.

- e) Submit a notarized certification, signed by an officer of the CONTRACTOR firm that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 8 CCR 1529.
 - f) Identify the laboratory that will be performing the analysis of the personal samples and provide their accreditation. Also discuss the method by which the CONTRACTOR will provide the analytical results to the PROJECT MONITOR within 24 hours of sampling completion.
4. Submit the following during and at the completion of the work
- a) Copies of all Waste Shipment Records
 - b) Copies of all air monitoring results within 24 hours
5. At the end of a project, the CONTRACTOR shall submit the following to the PROJECT MONITOR:
- a) Personal Air Sample Results
 - b) Copies of Project Daily Logs
 - c) Containment Entry/Exit Logs
 - d) Waste Disposal Documentation
 - e) Certificate of Visual Inspection

E. SCHEDULES AND REPORTS

1. Prior to each phase of project, the CONTRACTOR shall provide the City with a tentative time line which outlines the project schedule. These documents will be reviewed and approved by the City prior to the commencement of work.

F. PRODUCT DATA

1. The CONTRACTOR shall submit product information that is to be used during the construction activities prior to commencement of work. General information required includes manufacturer's standard printed recommendations for application and use, compliance with recognized standards of trade association and testing agencies, and safety data sheets (SDSs).
2. Polyethylene sheet
- a) A single polyethylene film in the largest sheet size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and clear, frosted, or black as indicated.
 - b) Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, and frosted or black as indicated.
 - c) Reinforced Polyethylene Sheet: Where plastic sheet is the only separation between the Work Area and building exterior, provide translucent, nylon reinforced, laminated, flame resistant, polyethylene film

that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 4.0 or 6.0 mil thick as indicated, frosted or black as indicated.

3. Tape
 - a) Provide duct tape in 2" or 3" widths as indicated, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
4. Spray adhesive
 - a) Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

G. PROJECT CLOSE-OUT

1. Upon completion of work and prior to payment, the PROJECT MONITOR will proceed with an initial inspection of the work area. A Certificate of Visual Inspection (Appendix B) will be signed by both the CONTRACTOR and PROJECT MONITOR. The CONTRACTOR will not be paid until the area meets the established project-specific clearance criteria and has submitted the required information.

II. DEFINITIONS

- A. ACCREDITED or ACCREDITATION (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA).
- B. ACTION LEVEL: An 8-hour time weighted average (TWA) lead airborne concentration of 30 µg/m³.
- C. AIR MONITORING: The process of measuring the lead content of a specific volume of air.
- D. AUTHORIZED VISITOR: The Owner, the Owner's Representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.
- E. BARRIER: Any surface that seals off the work area to inhibit the movement of dust.
- F. BREATHING ZONE: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- G. CONTAINMENT: A process for protecting both workers and environment by controlling exposures to lead dust and debris created during Lead Related Construction.
- H. CONTAMINATE: Refers to lead-containing dust/debris.
- I. CONTRACTOR: An EPA RRP Firm Certified painting contractor or their designated sub-contractor performing the required Lead Related Construction outlined in this specification.

- J. DEMOLITION: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- K. DISPOSAL BAG: A properly labeled 6 mil thick leak tight plastic bags used for transporting lead waste from work site to disposal site.
- L. ENCAPSULATION: Any covering or coating that acts as a barrier between lead based paint and the environment and that relies on adhesion and the integrity of the existing paint bonds between layers and with the substrate for its durability.
- M. ENCLOSURE: The use of rigid durable construction materials that are mechanically fastened to the substrate in order to act as a barrier between lead based paint and the living or work space.
- N. HEPA FILTER: A high Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of all mono-dispersed particles greater than 0.3 microns in diameter or larger.
- O. HEPA FILTER VACUUM COLLECTION EQUIPMENT (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining lead.
- P. HIGH PHOSPHATE DETERGENT: Detergent which contains at least 5% tri sodium phosphate.
- Q. LEAD: Means metallic lead, all inorganic lead compounds, and organic lead soaps.
- R. LEAD-BASED PAINT (LBP): For purposes of this project, LBP refers to the materials identified in these specifications as having paint or coatings that contains lead.
- S. LEAD-RELATED CONSTRUCTION SUPERVISOR: Means an individual who is responsible for implementing lead-related construction work and enforcing work practices. This person must have received certification as a lead-related construction Supervisor.
- T. LEAD-RELATED CONSTRUCTION WORK: Means any construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of a building, including preparation and cleanup, by disturbing lead-containing material that may result in exposure of individuals to lead.
- U. LEAD-RELATED CONSTRUCTION WORKER: Means any individual who performs lead-related construction work in a building under the direction of lead-related construction Supervisor, and has received certification as a lead-related construction Worker.
- V. OWNER: Refers to the City of San Diego
- W. PAINT FILM STABILIZATION: The process of using wet scraping, priming, and repainting a deteriorated lead based paint film in a dwelling including clean-up and clearance.

- X. PAINT REMOVAL: A strategy of abatement which entails removing lead based paint from surfaces of components using chemicals, heat guns below 11000F, and certain contained abrasive methods but not open flame burning, open abrasive blasting, sandblasting, water blasting, extensive dry scraping, or methylene chloride removers.
- Y. PERMISSIBLE EXPOSURE LIMIT (PEL): An 8-hour TWA lead airborne concentration of 50 µg/m³.
- Z. PERSONAL MONITORING: Sampling of contaminant concentrations within the breathing zone of an employee.
- AA. PROJECT MONITOR: City of San Diego Asbestos & Lead Management Program staff or their designated consultant.
- BB. PROTECTION FACTOR: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- CC. RRP: EPA's Renovation, Repair and Painting certification that requires contractor training and lead-safe work practices when performing renovation type activities in housing built prior to 1978.
- DD. REPLACEMENT: A strategy of abatement which entails the removal of components such as windows, doors, and trim that have lead painted surfaces and installing new components free of lead paint.
- EE. RESPIRATOR: A device designed to protect the wearer from the inhalation of harmful contaminants.
- FF. TESTING LABORATORIES: A "testing laboratory" is an entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on, and, if required, to interpret results of, those inspections or tests.
- GG. TIME-WEIGHTED AVERAGE (TWA): The average concentration of a contaminant in air during a specific time period.
- HH. TRIGGER TASKS: Work tasks that require an employer to assume specified employee exposures until the employer has performed an exposure assessment [see T8CCr, 1532.1 (d) (2)].
- II. WET CLEANING: The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of appropriately.

- JJ. WORK AREA: The area where Lead Related Construction operations are performed which is defined and/or isolated to prevent the spread of contamination, and entry by unauthorized personnel.

III. SITE WORK

A. INTRODUCTION

This portion of the specification describes procedures and protocols for Lead Related Construction. The protocols/procedures described hereafter are in accordance with federal/state/local requirements. In the absence of these requirements, the procedure/protocols are based on current industry standards.

B. BACKGROUND INFORMATION

Sampling of building materials has been performed by inspectors from the City's Asbestos and Lead Management Program (ALMP) and has been provided in Appendix C of this specification. The CONTRACTOR shall visit the project site and verify the location and quantities of the lead containing materials that will be removed under the terms and conditions of the contract and this specification

C. GENERAL INFORMATION

1. Potential Hazards

a) The disturbance of lead containing materials may cause exposure to workers and building occupants. All workers, supervisory personnel, subcontractors, and consultants who will be at the job site, need to be apprised of the seriousness of the hazard and of proper work practices which must be followed to minimize exposure. The procedures and methods described herein must be followed and the CONTRACTOR must comply with all applicable federal/state/local requirements.

2. Stop Work

a) If the PROJECT MONITOR presents a verbal or written stop work order, the CONTRACTOR shall immediately and automatically stop all work. Recommencement of the work may not begin until authorized by the PROJECT MONITOR.

D. PROJECT ADMINISTRATION

1. Certified Supervisor

The CONTRACTOR needs to provide a full-time lead supervisor who must have attended an 8 hour EPA accredited Renovate, Repair, Painting Contractor training and possess a current certification in accordance with 40 CFR 745, Subpart E. They shall also be experienced in administration and supervision of Lead Related Construction projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person will act as the competent person on the job. In addition, all workers shall have attended an RRP tailgate training as outlined in 40 CFR 745, Subpart E on have a signed proof of training onsite.

E. SPECIAL REPORTS

1. Reporting Unusual Events

When an event of unusual and significant nature occurs at the site (e.g., a spill of lead debris, failure of special equipment used to contain lead), the CONTRACTOR shall prepare and submit a special report listing the chain of events, persons participating, response by Contractor's personnel, evaluation of results, and other pertinent information.

2. Reporting Accidents

The CONTRACTOR shall prepare and submit reports of significant accidents at the subject site. Pertinent data and actions need to be recorded. In addition, response actions should comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury or potential environmental contamination.

F. COMPLIANCE WITH CODES AND REGULATIONS

1. Except to the extent that more explicit, or more stringent requirements are written directly into this Specification, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

2. The CONTRACTOR will assume full responsibility and liability for the compliance with all applicable federal/state/local regulations pertaining to work practices, protection of workers, and visitors to the site, persons occupying areas adjacent to the site, hauling, and disposal of waste. The CONTRACTOR shall hold the City and its representative harmless for the CONTRACTOR's failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of itself, its employees, or its subcontractors,

3. State requirements which govern lead hazard control activities or hauling and disposal of hazardous waste include, but are not limited to, the following:

- a) California Occupational Safety and Health Administration (Cal/OSHA):
 - (1) Division of Industrial Safety; Chapter 4
 - (2) 8CCR, Section 1532.1, Lead in Construction

- (3) 8CCR, Section 5194, Hazard Communication Standard
 - (4) 8CCR, Section 1531, Construction Respiratory Protection Standard
 - (5) 8CCR, Section 1514, Construction Personal Protective Equipment
 - (6) 8CCR, Section 1509, Construction Injury Illness Prevention Program
 - (7) 8CCR, Section 6003-4, Accident Prevention Signs and Tags
 - (8) 8CCR, Section 3204, Access to Employee Exposure Medical Records
- b) California Environmental Protection Agency (Cal/EPA):
- (1) 22CCR, Division 4.5, Environmental Health Standards for the Management of Hazardous Waste.
- c) California Department of Public Health (CDPH):
- (1) 17CCR, Division 1, Chapter 8, Accreditation of training providers and interim certification of individuals engaged in lead-related construction work.
4. Federal requirements which govern lead hazard control activities or hauling and disposal of hazardous waste include, but are not limited to, the following:
- a) Federal Environmental Protection Agency (FED/EPA):
 - (1) Hazardous Waste Standards, 40 Code of Federal Regulations (CFR), Part 261
 - (2) EPA Renovate, Repair, Painting (RRP), 40 CFR 745, Subpart E.
 - b) U.S. Department of Transportation (DOT):
 - (1) Hazardous Substances, 49CFR, Parts 171 through 180
 - c) American National Standards Institute, Inc. (ANSI):
 - (1) Z9.2-79 Fundamentals Governing the Design and Operation of Local Exhaust
 - (2) Z88.2-80 Practices of Respiratory Protection
 - d) Department of Housing and Urban Development (HUD):
 - (1) Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing (most current draft or final copy)
5. In addition, the CONTRACTOR must comply with any applicable regulations promulgated as a result of Title X, the Residential Lead Based Paint Hazard Reduction Act and Title IV, Lead Exposure Reduction Act.

6. Local requirements which govern lead hazard control activities include, but are not limited to, the following:
 - a) Air Pollution Control District (APCD) - San Diego County
 - (1) APCD Rules and Regulations, Rule 51 (Public Nuisance), Rule 10-11 (permitting of equipment)
 - b) San Diego Municipal Code §54.1001 etc. seq.
 - (1) Prevents, identifies and remedies lead hazards within the City of San Diego

G. PERMITS AND LICENSES

The CONTRACTOR shall submit to the City in the bid submittal any permits or licenses necessary to carry out this work.

1. Permits

A valid Hazardous Waste Hauler registration is required for transporting any hazardous waste. Certain types of equipment require APCD permits (e.g., abrasive blasters).

2. Licenses

The CONTRACTOR must be certified by the California Contractors State License Board. The Contractor, or its subcontractor, shall have current licenses, as required by all applicable state or local jurisdictions for the removal, transportation, disposal, or other regulated activity relative to the work described in this plan.

H. HEALTH AND SAFETY

This section describes the equipment and procedures required for protecting workers from lead contamination and other workplace hazards.

1. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work.
2. Training
 - a) CONTRACTOR workers shall be trained in accordance with 40 CFR 745, Subpart E and have a signed proof of training onsite.
 - b) Workers must be provided with initial biological monitoring (blood sampling) if they are occupationally exposed on any day to lead at or above the Action Level (AL). Employees must be provided with biological monitoring and a medical examination if they are occupationally exposed to lead above the action level for more than 30 days in any consecutive 12 month period. Periodic biological monitoring and medical examinations must be performed according to the schedule and criteria specified in T8CCR, Section 1532.1(j). In addition, employees performing "trigger" tasks must be included in biological monitoring and/or medical examinations based on their assumed exposure. In the absence of specific airborne exposure data, medical surveillance will need to be provided for all workers.

c) At a minimum, examinations shall meet all requirements as set forth in T8CCR, Section 1532.1. Furthermore, if an employee's blood levels are at or above 20µg/dl they will not be allowed to work on the project and shall be medically removed until two consecutive blood lead tests show the employee's blood lead level under 15µg/dl.

d) In addition, evaluations of each individual's ability to work in environments capable of producing heat stress in the worker should be completed. Employees who wear respirators must be medically evaluated.

3. Protective clothing

a) Coveralls: Provide disposable "full body" coveralls and disposable head covers, and require that they be worn at all times by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

b) Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with lead containing material. Thoroughly clean, decontaminate and bag boots before removing them from Work Area at the end of the work.

c) Hard Hats: Provide head protection (hard hats) as required by OSHA for all workers, and provide 1 spare for use by Owner's Representative, Project Administrator, and Owner. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of the type with plastic strap suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

d) Goggles: Provide eye protection (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

e) Gloves: Provide work gloves to all workers and require that they be worn at all times in the Work Area. Do not remove gloves from Work Area and dispose of as lead contaminated waste at the end of the work.

4. Respirators

a) Air Purifying Respirators

(1) Respirator Bodies: Provide half face or full face type respirators based upon appropriate protection factor as determined by the CONTRACTORS competent person. .

(2) Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Lead Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In

addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

(3) Non permitted respirators: Do not use single use, disposable or quarter face respirators.

(4) Require that respiratory protection be used at all times when there is any possibility of disturbance of lead containing or other hazardous materials whether intentional or accidental.

(5) Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne dust until the area has been cleared for re occupancy.

(6) Regardless of Airborne Levels: Require that the minimum level of respiratory protection used be a half-face air purifying respirators with high efficiency filters.

b) Fit testing

(1) Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection course of training. Only allow an individual to use respirators for which training and fit testing has been provided.

(2) Upon Each Wearing: Require that each time an air purifying respirator is put on it be checked for fit with a positive and negative pressure fit check in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).

c) Respirators, disposable coveralls, head covers, and foot covers shall be provided by the CONTRACTOR for the City of San Diego's Asbestos and Lead Management Program's PROJECT MONITOR, and other authorized representatives who may inspect the job site. Provide two (2) respirators and six (6) complete coveralls and, where applicable, six (6) respirator filter changes per day.

5. Materials and Equipment

a) Only material and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards, may be used.

6. Water Service

a) The CONTRACTOR will be able to obtain water services from on-site facilities. The City will designate the facilities from which water service may be obtained.

7. Electrical Services

a) The CONTRACTOR will be able to obtain electrical services from on-site facilities. The City will designate the facilities from which electrical services may be obtained. The CONTRACTOR shall provide their own electrical hook-ups, i.e. spider boxes, ground fault circuit interrupter (GFCI) etc. and installed by a licensed electrician.

b) The electrical services need to comply with the applicable NEMA, NECA, and UL standards, and governing regulations for materials and lay-out of temporary electrical services.

8. Sanitary Facilities

a) The CONTRACTOR shall provide sanitary facilities on-site if none have been made available by the City.

9. Fire Extinguisher

a) Applicable recommendations of the National Fire Protection Association (NFPA) Standard 10, "Standard for Portable Fire Extinguishers," must be complied with by the Contractor. Fire extinguishers need to be located where they are most convenient and effective for their intended purpose, but not less than one (1) extinguisher in each work area, the equipment room, outside/work areas, and in the clean room.

10. First Aid

a) The CONTRACTOR will need to provide first aid supplies which should comply with the governing regulations and recognized recommendations within the construction industry.

I. WORK AREA PROCEDURES

1. General guidelines for performing lead hazard control activities are presented in this section and are based on procedures established by HUD for residential settings. Due to the difference between residential settings and commercial buildings, these procedures will be modified on a case-by-case basis.

2. Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. Food and drinks are not allowed in the restricted work area.

3. CONTRACTOR shall secure work area from access by public, staff or users of the area. Accomplish this where possible, by locking doors, gates, or other means of access to the area.

4. Barricade fencing is required for securing an outside area from unauthorized access. Work area delineation shall occur at no less than twelve feet (12') from the radius of the work and/or building. Yellow caution tape shall not be used.

5. All windows, vents, mechanical systems, etc., in close proximity to the work area shall be sealed with plastic and tape by the CONTRACTOR prior to the work beginning.

6. A visitor entry and exit-log, and an employee daily sign-in log will be maintained throughout the lead hazard control activities. The CONTRACTOR shall be responsible for the project site security during the operations in order to protect work efforts and equipment.

J. REMOVAL OF LEAD CONTAINING MATERIALS

1. Lead containing materials shall be adequately wetted with water or a removal encapsulant before and during removal process, to reduce dust emission.
2. The CONTRACTOR should exercise caution in using water, as he will be solely responsible for any water damage to the facility resulting from the work.
3. CONTRACTOR is responsible for keeping all hazardous debris within the containment area at all times throughout removal. Any interior contamination, if created, is the responsibility of the CONTRACTOR to clean with no additional cost to this contract.
4. CONTRACTOR shall ensure there is no loose debris around the Work Area during the removal and if found, CONTRACTOR shall clean the area immediately.

K. CLEANING

1. Daily cleaning includes removing large and small debris, HEPA vacuuming horizontal surfaces, wet mopping, and then HEPA vacuuming horizontal surfaces, and possible exterior cleaning.
2. Final cleaning must occur no sooner than one (1) hour after lead hazard control activities are finished. All plastic should be misted, cleaned, and folded toward the center to trap any remaining dust. The order of removal should be upper plastic, the first layer of floor plastic, vent and door plastic, the second layer of floor plastic, and finally plastic separating contaminated from non-contaminated areas. Then the entire area should be cleaned using a HEPA vacuum/wet wash/HEPA vacuum cycle. This should be from ceiling to floor. Paint or otherwise seal treated surfaces with the exception of interior floors (floors will be sealed after clearance). The Supervisor should perform an inspection for visible dust and debris.
3. Additional cleaning cycles may be necessary for porous surfaces, and difficult to clean surfaces (crevices). Failure to meet clearance criteria will require additional cleaning.

L. DECONTAMINATION PROCEDURE

1. Prior to leaving the Work Area, HEPA vacuum outer suit completely and remove, turning it inside out while doing so.
2. Proceed to decontamination area where the second suit is to be removed while turning it inside out.
3. After wiping all areas and respirator, remove respirator and wipe facial area clean.
4. Place contaminated suits, towels, and respirator cartridges in a properly labeled waste containers.

5. At the completion of the project, boots, hard hats, and goggles should be decontaminated and bagged prior to removal from the Work Area.
6. Equipment leaving the Work Area should be HEPA vacuumed and wet wiped.

M. CLEARANCE

1. Clearance must be performed by a California Department of Public Health (CDPH) Certified Lead PROJECT MONITOR. It will not be performed by the CONTRACTOR (although the CONTRACTOR may perform their own clearance testing). Clearance testing must occur no sooner than one (1) hour after final cleaning. It consists of two steps; visual examination and possibly environmental sampling (dust and/or soil sampling).

a) Visual Examination for Determination of Completed Work:

(1) This is a determination that the work specified in the scope of work has been completed satisfactorily. For surfaces that are to be re-painted, it is important this examination occurs prior to the re-painting (to determine that either all the paint has been removed or that the deteriorated paint has been stabilized). Next the surfaces should be examined for settled dust and debris. If dust or debris is visually noted, the CONTRACTOR will be asked to re-clean prior to samples being collected.

(2) If no such dust/debris is found, the independent consultant or PROJECT MONITOR will complete a Certificate of Visual Inspection (Appendix B) for the area or for multiple areas. The Certified Supervisor will also sign this Certificate. The completed form should be submitted to the City at the end of the project.

2. Environmental Sampling:

a) The number and location of dust and/or soil samples will be determined on a case-by-case basis. The clearance criterion to be used is shown in the table below:

SurfaceLevel

(1)	Interior Floors	40 µg/ft ²
(2)	Interior Window Sills	250 µg/ft ²
(3)	Exterior Horizontal Surfaces	400 µg/ft ²
(4)	Exterior Soil*	1000 µg/ft ²

b) Re-cleaning, at the Contractor's expense, will be required for surfaces that do not pass clearance criteria.

c) The cost for additional tests, which may be required as a result of samples failing to meet the release criteria, shall be paid for the Contractor.

This cost shall include all costs associated with sample analysis and collection of additional samples, including Consultant fees.

* Soil may not be impacted as a part of the proposed work but if contamination occurs then levels shall be used for clearances. CONTRACTOR may take background soil samples to determine the preexisting soil conditions.

N. TRANSPORTATION AND DISPOSAL

1. Waste minimization
 - a) The CONTRACTOR is required to make all reasonable efforts to minimize the amount of hazardous waste generated from this project.
2. Waste characterization profile/determination
 - a) The CONTRACTOR shall test any potential hazardous waste generated in accordance with 22 CCR Division 4.5 within ten (10) days and/or prior to the end of the project to determine if it is hazardous waste and requires disposal. All paint chips will be considered hazardous waste and do not require testing. Components with lead paint that has been stabilized shall have a hazardous waste determination made prior to sending to a landfill.
3. Pre-transportation requirements
 - a) Any packaging used to ship hazardous waste off site such as a container, roll-off bin, tank or other device, must comply with 49 CFR Parts 173, 178, 179 and be labeled and prepared for transportation in accordance with 22 CCR Article 3.
 - b) The hazardous waste label must be affixed and filled out when the first amount of hazardous waste is placed in the container. The label must include the initial accumulation date.
 - c) All additional pre-transportation labeling, marking or placarding must be conducted prior to transporting off site and in accordance with 22 CCR Chapter 12, Article 3.
4. All containers and tanks of hazardous waste must be managed in a way which minimizes the threat of fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste to the air, soil or surface water which could threaten human health or the environment. Management techniques include containment areas capable of holding the contents of largest container within the containment area. Properly store and secure waste at all times. Do not leave hazardous waste in uncovered or unlocked trucks or dumpsters.
5. A hazardous waste manifest will be completed in accordance with 22 CCR Chapter 12, Article 2 for each shipment of hazardous waste leaving the work site. All waste shall leave the project site by the end of the project. Only The PROJECT MONITOR employees shall sign as the generator on manifests.
6. Disposal of the lead related hazardous wastes shall be by incineration unless otherwise specified by the ALMP.

APPENDIX A

CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

CONTRACTOR'S NAME: _____

Working with lead can be dangerous. Inhaling and ingesting lead dust can cause an increase in blood lead levels which can lead to adverse health effects such as kidney damage, elevated blood pressure or infertility.

Your employer's contract with the City for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These items are to have been done at no cost to you.

RESPIRATORY PROTECTION: You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: You must be an EPA certified Renovation, Repair, and Painting (RRP) Contractor or received training from an RRP contractor and be able to provide onsite documentation of training. You should have been trained in the dangers inherent in handling lead and breathing and ingesting lead dust and in proper work procedures and personal and area protective measures. The topics covered in the course must have included the following:

- Possible routes of exposure to lead
- Health hazards associated with lead
- Respiratory protection
- Use of protective equipment
- Work practices including hands on or on-the-job training
- Personal decontamination procedures
- Health and safety considerations

MEDICAL EXAMINATION: You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, physical examination, a blood pressure measurement, pulmonary function test and blood sample and analysis for lead.

By signing this document you are acknowledging only that the City has advised you of your rights to training and protection relative to your employer, the Contractor.

Signature: _____ Social Security No.: _____

Printed Name: _____

Witness (print): _____ Witness Signature: _____

APPENDIX B

CERTIFICATION OF VISUAL INSPECTION

Project # _____ Date: _____ Location: _____

Contractor: _____

The contractor hereby certifies that he/she has visually inspected the Work Area (all surfaces including pipes, counters, ledges, walls, ceiling and floor, behind critical barriers, sheet plastic, etc.) and has found no dust, debris or residue.

By: (Signature): _____ Date: _____

(Print Name): _____

(Company Name): _____

(Print Title): _____

CITY ALMP REPRESENTATIVE

The City ALMP Representative hereby certifies that he has accompanied the contractor on his/her visual inspection and verifies that this inspection has been thorough and to the best of his/her knowledge and belief, the contractor's certification above is a true and honest one.

By: (Signature): _____ Date: _____

(Print Name): _____

WORK AREA

Location: _____

Room: _____

Hazard Reduction Performed:

APPENDIX C

SUMMARY OF LEAD CONTAINING MATERIALS

Sample number	Location	Condition	Concentration of Lead
11	Beige Ceramic Floor Tile Entry Lobby	Intact	2.2 mg/cm ²
12	White Ceramic Floor Tile Break Room	Intact	2.1 mg/cm ²
14	Blue Ceramic Floor Tile Bath Hall	Intact	1.9 mg/cm ²
16	Beige Ceramic Floor Tile North Entry	Intact	8.6 mg/cm ²

APPENDIX L

DOIT NETWORK PROJECTS AND REQUIREMENT GUIDELINES

The City of San Diego - Department of Information Technology

Projects and Requirement Guidelines

Network Services

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Appendix E: Definitions

Backbone

A larger transmission line that carries data gathered from smaller lines that interconnect with it.

1. At the local level, a backbone is a line or set of lines that local area networks connect to for a wide area network connection or within a local area network to span distances efficiently (for example, between buildings).
2. On the Internet or other wide area network, a backbone is a set of paths that local or regional networks connect to for long-distance interconnection. The connection points are known as network nodes or telecommunication data switching exchanges (DSEs).

Computer Network

Also called a data network, is a series of points, or a connection point that can receive, create, store or send data along distributed network routes, interconnected by communication paths for the purpose of transmitting, receiving and exchanging data, voice and video traffic.

Definitive Estimate

Definitive Estimates are prepared by the vendor in the form of quote. Definitive Estimates are based upon refined requirements proved by the sponsoring department. The accepted variation between projected cost and final cost is -10 and 10%. They require time-consuming research to achieve the acceptable variance. At each phase of the project, definitive quotes will be generated for the next phase.

Gateway

A network node that connects two networks using different protocols together.

Intranet

An intranet is a private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. Typically, an intranet includes connections through one or more gateway computers to the outside Internet. The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences.

Internet

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers).

Internet Service Provider (ISP)

An ISP (Internet service provider) is a company that provides individuals and other companies' access to the Internet and other related services

LAN (Local Area Network)

A local area network (LAN) is a network that connects computers and other devices in a relatively small area, typically a single building or a group of buildings. Most LANs connect workstations and personal computers and enable users to access data and devices (e.g., printers and modems) anywhere on the network.

Network Services

An application running at the network application layer. It provides data storage, presentation, communications, or other capability in a client-server environment.

Network Service Provider

A company that provides backbone services.

Network Port

A process-specific or an application-specific software construct serving as a communication endpoint, which is used by the Transport Layer protocols of Internet Protocol suite, such as User Datagram Protocol (UDP) and Transmission Control Protocol (TCP).

Protocol

The special set of rules that end points in a telecommunication connection use when they communicate. Protocols specify interactions between the communicating entities.

ROM Estimate (we should discuss this)

A ROM Estimate is developed during the Init demand? of the project and is based upon historical data. It is a budgetary estimate based upon initial requirements provided by the sponsoring department. The accepted variation between projected cost and final cost is -25% and 75%.

WAN (wide area network)

A wide area network (WAN) is a geographically distributed private telecommunications network that interconnects multiple local area networks (LANs). In an enterprise, a WAN may consist of connections to a company's headquarters, branch offices, colocation-facilities, cloud services and other facilities

Appendix F: MDF/IDF Standards

MDF/IDF must be able to accommodate at a minimum; one, four post cabinet rack and two, two post racks with three feet of access front and back of cabinets/racks.

2-post rack

- Heights: 84" (2.1 m)
- Width: 20.3" (516.1 mm)

- Depth: 15" (381 mm)
- 4 Post Cabinet Rack
- Width: EIA Standard 19" Rack Rails
- External Width: 23.6" – 600mm
- Height: 78.74" – 2,000mm – Rack Units: 42U
- Depths: 39.37" & 41.34"

Appendix E: Service Provider Site Requirements

- Place a minimum 4' x 4' x ¾" fire-rated plywood backboard
- Place a 120V AC dedicated outlet on a dedicated 15Amp circuit breaker. Single standard 3 prong 120V AC, 15Amp dedicated receptacle. Within 5' of equipment mount
- Place new #6 ground wire bonded to an MGN (except in CA) or UFER Ground terminated to a grounding bus bar 2" Sleeve(s).
- Backboard must be mounted to wall with proper drywall anchors and not just screws
- Active equipment must not be installed within 3' of electrical panels
- Active equipment must not be installed within 3' of water sources (sinks, wash basins)
- All equipment needs to be installed in accordance of all ADA code (leaving 36" open fare ways)

Appendix G: Ingress/Egress Conduit Requirements

1. Four, 2 or 4 inch diameter schedule 80 PVC electrical conduit
2. Pull rope to be installed shall be low friction; polyethylene jacketed polyester core rope with 1800 psi tensile strength.
3. Subsurface conduit to be installed a minimum of 18 inches below the finished surface in paved areas, 30 inches below finished surface in unpaved areas, and 36 inches below the bottom of railroad ties.

Appendix H: Cabling Standards

1. 1-Gigabit Ethernet over Copper
 - a) CAT6 Cabling
 - i) Cross-over cable to use T568A Pinout and T568B Pinout
 - ii) Straight-through cable to use T568B Pinout
2. 10-Gigabit Ethernet over Copper
 - a) CAT6a Cabling
 - i) Cross-over cable to use T568A Pinout and T568B Pinout
 - ii) Straight-through cable to use T568B Pinout
3. Cables that are to run through the ceiling or under the floor must be plenum-rated.
4. One year warranty on work

Appendix I: Site Power Requirements

Site power requirements are determined based upon the number of users and number of network devices being deployed.

Small Deployments

Quantity of 2, 5-15P outlets on 120 volt, 15 amp circuits. Within three feet of the network racks and cabinets.

Medium Deployments

Quantity of 2, NEMA L5-30P outlets on 120 volt, 30 amp circuits. Within three feet of the network racks and cabinets.

Large Deployments

Quantity of 4, NEMA L6-30P outlets on 208 volt, 60 amp circuits. Within three feet of the network racks and cabinets.

Appendix J: Fiber Optic Infrastructure Standards

STANDARDS DOCUMENTS

The optical fiber infrastructure shall conform to the latest issue of the following standards documents, which are incorporated by reference into this specification:

ICEA S-104-696	Standard for Indoor/Outdoor Optical Fiber Cable
ICEA S-83-696	Fiber Optic Premises Distribution Cable (Indoor/Outdoor)
IEEE Std 383	Flame Retardancy
MIL-STD 1678	Fiber Optics Test Methods
NEC Article 770	Optical Fiber Cables and Raceways
NFPA 262	Standard Method of Test for Flame Travel and Smoke of Wires and Cables for use in Air Handling Spaces
TIA/EIA-310	Racks, Panels and associated equipment
TIA/EIA-472	Generic Specifications for Fiber optic cable
TIA/EIA-455	Standard Fiber Optic Test Procedures (FOTP's)
TIA/EIA-4750000	Generic Specification for Fiber Optic Connectors
TIA/EIA-492	Specifications for Optical Fiber Cables
TIA/EIA-568	Commercial Building Telecommunications Cabling Standard: Optical Fiber Cabling Components
TIA/EIA-598	Optical Fiber Cable Color Coding
TIA/EIA-604-10	Fiber Optic Connector Intermateability
UL 1666	Safety Test for Flame-Propagation Height of Electrical and Optical Fiber Cables in Vertical Shafts

Where reference is made to one of the above standards, the latest revision shall apply.

PRODUCTS

1.1 Fiber Optic Cable

The cable shall be the ALTOS or ClearCurve Series as manufactured by Corning Cable Systems, or equal.

The cable jacket shall be marked with manufacturer's name, sequential meter or foot markings, date of manufacture and a telecommunication handset symbol, as required by Section 350G of the National Electrical Safety Code (NESC). The markings shall be in contrasting color to the cable jacket.

Optical fibers for back-haul shall be single-mode (SM) step index optical glass wave-guides with a nominal core diameter of 8 to 9 microns. The fiber shall have a transmission window centered at 1310 nanometer (nm) wavelength and an optical window from 1300 to 1600 nm. Multi-mode fiber should only be used for repairs to existing multi-mode cables and for short hauls in order to mitigate issues related to receiver saturation caused by lack of attenuation.

For all fibers the attenuation specification shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

- (1) @ 1,310 nm, 20 C: less than 0.4 dB/km
- (2) @ 1,383 nm, 20 C: less than 0.4 dB/km
- (3) @ 1,550 nm, 20 C: less than 0.3 dB/km

The Fiber Optic Cable shall have individual glass fibers evenly distributed among buffer tubes, 12 fibers per tube.

Loose buffer tubes shall provide clearance between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers shall be loose or suspended within the tubes and shall not adhere to the inside of the tube. Buffer tubes shall be constructed with a water-swellable component located near the fibers or be filled with filling compound or water-swellable yarn.

Cable shall have dry core buffer tube with water swellable strength member surrounding the core buffer tube to prevent water migration.

The loose buffer tubes shall be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Each fiber shall be distinguishable by means of color-coding in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding" and shall be targeted in accordance with the Munsell color shades. The color formulation shall be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto each other or into the gel filling material. Colors shall not cause fibers to stick together.

Optical fibers shall be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)
2. Orange (OR)
3. Green (GR)
4. Brown (BR)
5. Slate (SL)
6. White (WT)
7. Red (RD)
8. Black (BK)
9. Yellow (YL)
10. Violet (VL)
11. Rose (RS)
12. Aqua (AQ)

Completed buffer tubes shall be stranded around the central dielectric strength member using stranding methods, lay lengths and positioning such that the cable shall meet mechanical, environmental and performance Specifications. A polyester binding shall be applied over the stranded buffer tubes to hold them in place. Binders shall be applied with sufficient tension to secure

the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking, and dielectric with low shrinkage.

The dielectric central member shall prevent buckling and shall be a glass reinforced plastic rod, or approved equivalent, with similar expansion and contraction characteristics as the optical fibers and buffer tubes. A linear overcoat of low density polyethylene shall be applied to the dielectric strength member to achieve the optimum diameter to provide the proper spacing between buffer tubes during stranding.

Fillers may be included in the cable to lend symmetry to the cable cross-section where needed. Filler rods shall be solid polymeric compound. The diameter of filler rods shall be the same as the outer diameter of the buffer tubes.

The cable shall have a ripcord enabling the jacket to be split.

All fiber optical cables shall be constructed in accordance with EIA-455, and 100 percent of all optical fibers and jacketing shall meet or exceed the requirements contained in this specification.

Outdoor, Loose Tube, Fiber-Optic Cable shall be constructed with loose buffer tubes containing fibers in the quantities specified and indicated. All fiber-optic cable shall be from the same manufacturer. Cable shall meet or exceed the following specifications and conform with the latest issue of ICEA S-104-696 Standard for Indoor-Outdoor Optical Fiber Cable.

The loose tube cables shall comply with the optical and mechanical requirements over an operating temperature range of -40°C to +70°C. The cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in optical attenuation at extreme operational temperature (-40°C to +70°C) shall not be greater than 0.20 dB/km, with 80 percent of the measured values no greater than 0.10 dB/km.

Materials used within a given cable shall be compatible with all other materials used in the same cable when such materials come into contact. All cable components used shall not adversely affect the optical transmission or the mechanical integrity of the fiber placed in the cable. All materials used shall be non-toxic, non-corrosive, and shall present no dermal hazard. Cable shall be manufactured continuous with no factory splices in the fiber.

The fiber optic cable shall not be adversely affected by the following mechanical and environmental conditions.

Crush Resistance: The cable shall not be crushed by a 10,000 n/m (6.78 lb/ft) load.

Minimum Bending Radius: The cable shall be designed for a minimum bending radius of:

Installation (Loaded): 20 x cable diameter

Static (Installed): 10 x cable diameter

Temperature:

Operational: -40 to +70C

Storage: -40 to +70C

Humidity: 0 to 100%

Tensile Strength:

The cable shall not be damaged under the following tensile load:

Installation: 2,700 N (600 lbf) (16 ft)

Static: 600 N (135 lbf) (16 ft)

Compressive Load: When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber-optic cables," the cable shall withstand a minimum compressive load of 220 N/cm (125 lbf/in) applied uniformly over the length of the sample. The 220 N/cm (125 lbf/in) load shall be applied at a rate of 2.5 mm (0.1 in) per minute. The load shall be maintained for a period of 1 minute. The load shall then be decreased to 110 N/cm (63 lbf/in). Alternatively, it is acceptable to remove the 220 N/cm (125 lbf/in) load entirely and apply the 110 N/cm (63 lbf/in) load within five minutes at a rate of 2.5 mm (0.1 in) per minute. The 110 N/cm (63 lbf/in) load shall be maintained for a period of 10 minutes. Attenuation measurements shall be performed before release of the 110 N/cm (63 lbf/in) load. The change in attenuation shall not exceed 0.40 dB at 1550 nm for single-mode fibers.

1.2 Fiber-Optic Terminations

All components shall be the size and type required for the specified fiber. Cable and cable assemblies (jumpers and pigtails) shall be products of the same manufacturer.

1.2.1 Jumpers

Jumpers may be of simplex or duplex design. All jumpers shall be at least 2 meters in length, sufficient to avoid stress and allow orderly routing.

The outer jacket of duplex jumpers shall be colored according to the singlemode color (yellow) specified. The two inner simplex jackets shall be contrasting colors to provide easy visual identification for polarity.

1.2.2 Connectors

Fiber optic connectors shall be ceramic ferrule LC Duplex type for single-mode fiber. Indoor LC Duplex connector body housings shall be either nickel plated zinc or glass reinforced polymer construction. Outdoor LC Duplex connector body housing shall be glass reinforced polymer. LC connectors shall be constructed with materials suitable for both indoor and outdoor environments.

The associated coupler shall be of the same material as the connector housing and contain ceramic sleeves. The coupler shall meet all the specifications as outlined in TIA/EIA-604-10.

The LC Duplex connector operating temperature range shall be -40°C to $+85^{\circ}\text{C}$. Insertion loss shall not exceed 0.4dB, and the return reflection loss shall be a minimum of -55dB. All LC connectors, adapters and assemblies shall comply with the mechanical, environmental and performance criteria as outlined and specified in the TIA/EIA-604-10 and relevant FOTP standards. All connectors shall have blue or yellow color on the body and/or boot, as stated in the TIA/EIA standard, which identifies the system as single-mode.

1.3 Fiber Distribution Unit (FDU)

All FDU types shall conform to the following requirements:

Patch panels shall provide a hold-down clamp securing the Fiber Optic Cable to the patch panel housing and for providing strain relief.

Patch panels shall have adequate facilities for storing Fiber Optic Cable buffer tube slack and shall include routing guides.

The patch panel housing shall have multiple locations for jumper egress.

Each patch panel shall be furnished with single mode LC duplex (dual fiber) jumpers 2 meters in length.

Fiber distribution units shall be installed as close to the top of the rack as possible and shall be clearly labeled with the Fiber Optic Cable that is terminated into it.

1.4 Splice Closures

All splice closures shall be re-enterable type splice closures which shall be complete with splice organizer trays, brackets, clips, cable ties, and sealants, as needed.

Closures shall be rodent proof, water proof, and expandable from 2 cables per end to 8 cables per end by using adapter plates. Cable entry ports shall accommodate 0.28 inches (7 mm) to 0.79 inches (20 mm) diameter cables.

The fiber splice closure shall be mounted horizontally in a manner that allows the cables to enter at the end of the closure. Splice closures located in vaults shall have not less than 9 m of each cable coiled in the vault for the fiber splice closure to be removed for future splicing.

The splice closures shall be suitable for a temperature range of 15°F (-9°C) to 130°F (54°C), accommodate up to 13 splice trays and be suitable for "butt" or "through" cable entry configurations.

Each splice shall be individually mounted and mechanically protected in the splice tray. The closure shall have cable retention clamps to prevent pullout of the fiber optic cable in accordance with Telcordia™ standards.

1.4.1 Type 1 - Aerial Fiber Optic Cable Splice Closure

Splice enclosure shall be securely fastened to and supported from the 3/8 inch EHS galvanized steel strand wire using a mechanical clamping method. Closure shall be designed for aerial application and be ultraviolet radiation resistant in conformance with Telcordia™ aerial weather tight closure standards.

1.4.2 Type 2 - Fiber Optic Cable Splice Closure Located in a Vault

The fiber optic splice closures shall be securely fastened to the fiber optic vault or wall using standard hardware as recommended by the closure manufacturer. The fiber optic splice closure shall be mounted horizontally in a manner that allows the cables to enter at the end of the closure. Not less than 30 feet (9 m) of each cable entering the closure shall be coiled in vault to allow the fiber splice closure to be removed for future splicing.

1.4.3 Type 3 - Fiber Optic Cable Splice Closure Located in an Equipment Rack

The fiber optic splice closure shall be rack mounted in a 19-inch rack and shall have the capacity to splice the number of fibers found in the connecting cables (i.e., 12, 24, 72, and 144 strands).

1.5 Conduit

1.5.1 General

Conduit shall be two to four-inch diameter Schedule 80 PVC electrical conduit including fittings for underground installation. Conduit shall be UL listed for the indicated application. Conduit sections shall be joined in accordance with the Manufacturers' recommendations. All joints shall be watertight.

All conduits shall be cleaned and tested prior to installation of cables.

Conduits entering pullboxes shall be sealed with Tyco Simplex Seal or equal.

Pull rope shall be installed in the conduit and shall be low friction; polyethylene jacketed polyester core rope with 1800 psi tensile strength. Provide Vikamatic "Fiber Glide" or equal.

The conduit shall gradually and smoothly slope up to the elevation of the pullbox entrance. Use of manufactured bends shall be limited to an absolute minimum. Factory bends, if required, shall be no more than 22½ degrees.

All subsurface conduit shall be installed a minimum of 18 inches below the finished surface in paved areas, 30 inches below the finished surface in unpaved areas, and 36 inches below the bottom of railroad ties.

Conduit trenching and backfill shall comply with San Diego Regional Standard Drawing G-33, Type A, with the following change to Note 10: Select material with a minimum sand equivalent of 50 shall be backfilled to 3 inches minimum above the conduit.

1.5.2 Conduit Installation along Pipelines

For conduits installed with a pipeline, conduits shall clear concrete structures and vaults associated with the pipeline by a minimum of one foot.

Conduits shall be installed on one side of the trench, at least 2 inches and not more than 12 inches from the trench wall, at a depth of 3 to 4 feet below grade along the entire pipeline route. The conduit shall not cross over the pipe.

Conduit shall be installed in the annular space between the carrier pipe and the casing or tunnel liner for all two-pass tunnel or jack and bore sections of the pipeline alignment.

Marker signs for fiber optic cable shall be installed on all marker posts for the pipeline.

1.6 Cabinets

Cabinets shall be standard CALTRANS Type 332, furnished without traffic control components. Cabinet material shall be 0.125 inch aluminum, with full front and back doors, shall have stainless steel handles with padlock feature, and shall be furnished

with Best locks (lock core will be provided by the City). Finish shall be natural aluminum. Cabinets shall accommodate 19-inch standard EIA rack assemblies. Cabinets shall be installed on reinforced concrete pads.

1.7 Pullboxes

Pullboxes shall be Caltrans standard No. 6, approximately 32 inches wide by 49 inches long by 36 inches deep. Covers for pullboxes in paved areas shall be galvanized steel, rated for H-20 traffic loading. Covers for pullboxes in sidewalks and unpaved areas shall be concrete. Bolts shall be 316 stainless steel. Covers shall have the words "Fiber Optic" OR "Communications" in letters on the top. Covers shall have locking devices and form a watertight seal to prevent surface water from entering. Knockouts in the sidewalls shall permit underground conduit side entry and exit.

Pullboxes shall be located according to the following criteria:

The maximum distance between any two pullboxes shall not exceed 1,200 feet. Within the 1,200-foot distance, pullboxes shall be installed at locations wherever the cumulative change of direction of the conduit exceeds 180 degrees.

The minimum bending radius for conduit shall be 3 feet.

A pullbox shall be installed on one side of a tunneled crossing. However, for any crossing which requires more than 180 degrees of conduit bends to account for elevation differences or route adjustments, a pullbox shall be provided on both sides of the crossing.

Pullboxes shall be installed a minimum of 12 inches from all structures.

Pullbox covers shall be installed so that the top of the cover is flush with the restored pavement. Pullboxes installed in soil areas shall be installed so that the top of the cover is at least one inch but not more than 4 inches above the final grade level of the restored surface to prevent accumulation of dirt, silt and debris on the top of the hand hole cover. Pullboxes installed in areas not subject to flooding or standing water shall have a minimum of five (5)-inch drainage holes in the bottom of the box.

Conduit integrity tests shall be performed for each section between the pullboxes after backfilling and compaction using the test and procedures described in this Section. These tests shall be performed prior to installation of the pull rope.

Pullbox conduit entries shall be sealed with duct plugs to prevent the intrusion of water and debris into the pullboxes.

Pullboxes shall be installed on a compacted level foundation consisting of 4 inches of granular material.

SPLICING

FOC splices shall be fusion type. Every splice shall be tested. The mean splice loss shall be obtained by measuring the loss through the splice in both directions and then averaging the resultant values. The test shall be conducted at 1550 nanometers using an OTDR.

At locations where new FOCs are being spliced together, the mean splice loss shall not exceed 0.05 dB per splice. At locations where new Fiber Optic Cable is to be spliced onto existing FOC, the mean splice loss shall be lower than 0.1 dB per splice.

The field splices shall connect the fibers of the two Fiber Optic Cable lengths together. These splices shall be placed in a splice tray and the splice tray(s) shall then be placed in the splice closure.

Fibers of the same buffer tube, but not being spliced shall be placed in a splice tray along side spliced fibers. Buffer tubes that do not require enclosed fibers to be spliced shall not be disturbed and placed in the splice closure.

The termination splices shall connect the Fiber Optic Cable span ends with pigtails. The termination splices shall be placed in a splice tray and the splice tray(s) shall then be placed in the fiber distribution unit (FDU).

The individual fibers shall be looped one full turn within the splice tray to avoid micro bending.

A 50 mm minimum bend radius shall be maintained during installation and after final assembly in the optical fiber splice tray. Each bare fiber shall be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the bare optical fiber in the splice tray shall be such that there is no discernible tensile force on the optical fiber.

All splices shall be protected with a metal reinforced thermal shrink sleeve.

Splices shall be made in pullboxes and shall use re-enterable splice closures.

FIBER OPTIC CABLE INSTALLATION

The cable shall not be pulled through more than 180 degrees of total bends in a continuous run. Where the cable is to be pulled through a raceway containing more than 180 degrees of load change, the cable shall be installed through multiple pulls by setting up pull and payoff points at intermediate vaults, manholes, or pull boxes.

The cable shall be looped in all pullboxes to provide approximately fifteen (15) feet of extra cable in the pullbox. At termination points, such as at cabinets or computers, a fifteen (15)-foot loop shall also be provided wherever space permits. The fiber optic cable shall be coiled and secured with cable ties in the pullbox.

1.8 Pulling Method

The take-up reel shall be started and the cable pulled at a speed no more than 5 miles per hour. Once cable movement has started a constant pull speed shall be maintained.

The brake at the payoff reel shall be engaged to maintain adequate back tension and to prevent the cable from running free. Loss of back tension during the pull may result in twisting and possible damage to the cable.

At all times during the pull, the tensional operator shall monitor the tension meter to assure that the maximum pulling tension is not exceeded.

The cable shall be continuously inspected as it leaves the reels. If any damage or deformity is found, stringing shall be stopped and corrective action shall be taken prior to continuing the pull.

When the pulling grip is removed, cut off a minimum of twenty feet past the end of the grip to assure no stressed cable is used.

1.9 Air Blown Method

The "Air Blown Method" shall be an installation method that uses a mechanical device combined with a high speed air flow or compressed air to place cables into conduits, ducts, or subducts.

The "Air Blown Method" shall conform to the following:

The method shall install cable without exceeding the cable manufacturer's tensile and compressive strength ratings.

The mechanical device shall be used to provide a pushing force on the cable into the conduit. The cable installation equipment shall also have, at a minimum, the following features:

- a. Controls to regulate the flow rate of compressed air entering the conduit, duct or subduct, and any hydraulic pneumatic pressure applied to the cable.
- b. Safety shutoff valves to disable the system in the event of sudden changes in pneumatic or hydraulic pressure.
- c. Measuring device to determine the speed of the cable during installation and the length of the cable installed.

Provide Kellem grips and other supporting devices as required to support the cable in all vertical runs.

Apply an approved cable pulling lubricant to the cable as it is pulled off the payoff reel to minimize friction.

1.10 Aerial Fiber Optic Cables

All installation Work shall strictly adhere to the practices and procedures defined by the California Public Utilities Commission (CPUC) General Order No. 95 and 128 (GO 95 and GO 128). Attachment points shall be selected so that clearances required by GO 95 are maintained in all cases and does not interfere with the performance of the existing catenary assemblies.

Fiber optic cable shall be carried on a single messenger supported and routed on catenary poles as shown on the plans. Fiber Optic Cable shall be double lashed to the strand through the use of a mechanical cable lasher. Lashing wire shall be stainless steel wire, 0.045 inch diameter.

Splices shall not be permitted in the aerial fiber optic cable except where shown on plans. Aerial storage and splice closure assemblies shall be installed at locations shown on plans. The aerial storage and splice closure assemblies shall be firmly supported from the 3/8 inch guy strand.

Heat-shrinkable end caps shall be placed on cable ends that are exposed to an outdoor environment (including in a pull box) to prevent water penetration until splicing. End caps are not required if the cable end is located in an environmentally controlled communication room or equipment enclosure.

Cable-warning tags shall be installed at every structure attachment location. All cable tags shall be affixed to the cable at an orientation at which they will be easily read from the ground. All cable tags shall be tightly fastened with at least 2 cable ties to the cable in such a manner that will not permit slippage or rotation in any direction.

1.11 Fiber Optic Cables Pulled in Conduits and Raceways

All wiring and cabling shall be installed in conduit, except where overhead, or where cable is run inside the pole.

When new Fiber Optic Cable or signal conductors are added or existing conductors removed from existing conduit, all conductors shall be removed, the conduit shall be cleaned and both old and new cables and/or conductors shall be pulled into the conduit as a unit.

A trace wire shall be installed along the entire fiber optic cable route for use in active cable location. The trace wire shall be a #8 AWG bare-copper solid strand. No insulation or other coating material shall be on the trace wire. The trace wire shall provide a termination at each pullbox for connection to testing equipment.

Identification Tape: A 6-inch wide magnetically detectable warning tape with orange protective polyethylene jacket resistant to alkalis, acids, and other destructive elements shall be installed along the entire length of the conduit route. The polyethylene tape shall be continuously imprinted "CAUTION-FIBER OPTIC CABLE". The warning tape shall be Teletrace by Vikamatic, or equal.

TESTING

1.12 Pre-Installation Tests

The purpose of these tests is to perform acceptance tests on the cable prior to installation to verify that the cable conforms to the manufacturer's specifications, and is free of defects, breaks and damages by transportation and manufacturing processes.

Prior to removal of each cable from the delivery reel, all optical fibers within the cables shall be tested using an OTDR. The OTDR tests shall consist of end-to-end length and fiber attenuation (dB/km) measurements to ensure proper performance of the fiber optic cable. The tests shall be performed from both ends of each fiber to ensure complete fiber continuity within the cable structure.

Pre-installation, "on-reel" test results shall be compared with the manufacturer's test report delivered with the cable. Gross dissimilarities shall be noted and remedied between the contractor and manufacturer. In all cases, all fibers must meet the optical attenuation specifications prior to cable installation.

Maximum allowable attenuation is 0.4 dB/km at 1310 and 1550 nm.

1.13 Post-Installation Tests:

After Fiber Optic Cable has been installed the following tests shall be performed:

A recording OTDR shall be used to test for end-to-end continuity and attenuation of each optical fiber. The OTDR shall be equipped with a 1310 nm and 1550 nm light source for the single mode fiber (SMF). The OTDR shall have an X-Y plotter to provide a hard copy record of each trace of each fiber. The OTDR shall be equipped with sufficient internal masking to allow the entire cable section to be tested. This may be achieved by using an optical fiber pigtail of 30 feet or more to display the required cable section.

The maximum permissible end-to-end loss shall be 0.5 dB/km at 1310 nm and 1550 nm.

When conducting tests, a Launch reel shall be used in conjunction with the OTDR. This provides the tester with the ability to accurately measure the connector loss, connection back reflectance and the adjacent splice loss on a short span (15-30 meters from the terminating distribution panel). Pigtail tests taken with long patch cords or any other "adaptation" shall not be allowed. All testing shall be conducted at both ends of the fiber.

The following index of refraction shall be used: 1.4675 @ 1310 nm and 1.4681 @ 1550 nm. Both wavelengths 1310 nm and 1550 nm shall be used in testing.

Upon completion of testing, all Fiber Optic Cable coils shall be secured with ends capped to prevent intrusion of dirt and water.

Required OTDR Trace Information

All traces shall display the entire length of cable under test, highlighting any localized loss discontinuities (installation-induced losses and/or connector losses). The trace shall display fiber length (in kilofeet), fiber loss (dB), and average fiber attenuation (in dB/km) as measured between two markers placed as near to the opposite ends of the fiber under test as is possible while still allowing an accurate reading. Care shall be taken to ensure that the markers are placed in the linear region of the trace: away from the front-end response and far-end Fresnel reflection spike. Time averaging shall be used to improve the display signal to noise ratio. The pulse width of the OTDR shall be set to a sufficient width to provide adequate injected power to measure the entire length of the fiber under test.

If connectors exist in the cable under test, then two traces shall be recorded. One trace shall record the fiber loss (dB) and average attenuation (dB/km) of the entire cable segment under test, including connectors. The second trace shall display a magnified view of the connector regions, revealing the connector losses (dB). All connector losses shall be measured using the 5-point splice loss measurement technique.

The OTDR trace shall also include the following information:

- a. The date and time of the test
- b. The cable ID number
- c. The cable segment ID number
- d. The fiber color or sub-cable number
- e. Launch point connector number
- f. The optical wavelength used for the test
- g. The refractive index setting of the OTDR
- h. The pulse width setting of the OTDR
- i. The averaging interval of the test

1.14 Splice Tests

At the conclusion of all splices at one location, and before they are enclosed and sealed, all splices shall be tested with the OTDR, in both directions. Splices in segments shall be tested at 1310 nm and at 1550 nm. Individual fusion splice losses shall not exceed 0.1 dB bi-directionally. Measurement results shall be recorded, dated, validated by the OTDR trace printout and filed with the records of the respective cable runs.

In developing the distribution interconnect package, each LC termination (pigtail or jumper) shall be tested for insertion attenuation loss with the use of an optical power meter and light source. In addition, all singlemode terminations shall be tested for return reflection loss.

1.15 System Verification Testing at Completion

For terminated fibers, jumpers shall be used at both ends under test to validate connector loss. Once the passive cabling system has been installed and is ready for activation, 100 percent of the fiber links shall be tested with the OTDR for attenuation. Print out shall include at a minimum, link number, fiber color, buffer color and cable number. Test results shall be recorded, dated, compared and filed with previous copies.

The OTDR testing equipment shall be calibrated to detect anomalies of no less than 0.2 dB. The OTDR testing equipment shall support generation of test reports on paper. All testing shall be performed in accordance with the fiber optic test procedures defined in EIA 455-59 and as follows:

- a. Verify the fiber length given by the trace corresponds to the estimated fiber run length.
- b. Verify no significant anomaly/loss exists on the "test fiber" that adds loss to the fiber run.
- c. Singlemode fibers shall be tested at 1310 nm and 1550 nm.

Power Meter and Light Source -- At the conclusion of the final OTDR testing, 100 percent of all fiber links shall be tested end to end with a power meter and light source, in accordance with EIA Optical Test Procedure 171 and in the same wavelengths specified for the OTDR tests. These tests shall be conducted in both directions. Test results shall be recorded, compared and proven to be within the design link loss budgets, and filed with the other recordings of the same links.

Design Link Budget – Design Link budget shall be calculated following the following example:

Fiber loss (including splices): 0.4 dB/km at 1310 nm

Connector loss: 0.30 dB per connection

If testing a run that is 30 km long with one patch-through (via patch cords) in the span, an expected loss at 1310 nm would be:

Fiber loss = 30 km x 0.4 dB/km = 12 dB

Connector loss = 4 connectors x 0.30 dB/connector = 1.2 dB

(one connector on each end and two connectors at the patch-through)

Therefore, a total expected loss = 13.2 dB.

APPENDIX M

FURNITURE, FIXTURES AND EQUIPMENT (FF&E) LIST

	B	C	D	F	G	H	I	J	K
1	Master List for AirOps								
2	Furniture, Fixtures & Equipment								
3									
4									
5	Description	Location	Size	Manufacturer	Product Name	Product Number	Web Link	Fabric/Notes/Options	Qty
6	JANITOR #131								
7	Mops	Janitor	Handle & Mop head	Unisan					6
8	6 Mop handle holder/dryer	Janitor	6 utility holder w/ shelf	ASI (OR SIMILAR)	Janitorial Supply	1315-6 (OR SIMILAR)		(OR SIMILAR)	1
9	Gas dryer	Janitor		Speed Queen	Gas dryer	Model # ADG3LRG			1
10	Front loader washer	Clean rm.	Commercial grade 21.5 lb. capacity	Speed Queen	Speed Queen front loader washer	Model # SFNNCASP113TW01	Speed Queen	Contact: Jeff McGarity at PWS Laundry Company. Ph: 619-805-197	2
11	Buckets	Janitor	35QT	Rubbermaid		BruteWaveBrake			6
12	Floor squeegees	Janitor	30" wide	Ettore		ETT55037EA			4
13	commercial hose/ 50 ft.	Janitor	50ft long	Teknor Apex	Apex 50' Commercial Hot Water Hose	T43S5050RD		(OR SIMILAR)	6
14	Window Squeegees	Janitor		Unger		UNG PWKO			4
15	Air Dry Laundry Rack - Free standing	Wash Area/TBD	72" L x 21" d x 74" T	Ready Rack	Air Drying Laundry Rack	SKU: DPF	Customer service: 800-991-2120	Heavy Duty chromate finish with a clear coat sealer	1
16	STORAGE #117 & #120								
17	Window washing equipment	Storage	Pole w/ extention, mop, squeegee	JL	Window Cleaning Bucket Kit	807820WC-KIT	https://www.janilink.com/product_info.php?products_id=15946&source=googleps&qclid=CLmkt4DAwsUCFYOTfgodXzYA6w		2
18	Step Ladder	Storage	6FT. Fiberglass	Werner	fiberglass, commercial grade	6206			1
19	14 ft. A Frame ladder	Storage	14FT. Aluminum or Fiberglass	Werner	14ft A-Frame Ladder	T7414		(OR SIMILAR)	1
20	Extension ladder	Storage	20' Ext. Ladder - 300lbs Max	Werner	extension ladder	D6220-3		(OR SIMILAR)	2
21	Retractable Reeled Extention Cords	Storage	50-feet	U-Line	All Purpose Extension Cord and Reel	S-19879	http://www.uline.com/Product/Detail/S-19879/Extension-Cords-Surge-Protectors/All-Purpose-Extension-Cord-and-Reel-50?pricode=WY596&gadtype=pla&id=S-19879&qclid=CPrB4JHFwsUCFU9ffg odP4UACA&gclsrc=aw.ds	Near work bench	2
22	Vacuum	Storage		Dyson, Oreck or equivalent	Commercial			OR101	1
23	Wet-Dry Vacuum	Storage	6 Gallon Min	Shop Vac					1
24	Cordless Tool Kit	Storage	18V	Dewalt	18V cordless combo kit	334740	http://www.northerntool.com		1
25	Hand Tool set & box	Storage	157 Piece tool kit	Wilmar	157 Piece tool kit	SPM198326422	www.sears.com		1
26	Replacement Bulbs	Storage	10% of all lighting fixtures						TBD
27	Hand brooms/dust pans	All dorms		Broom & Dust pan	Janitorial Supply				10
28	Gas blower	Storage		Stihl	Blower	BG 56CE	http://www.stihlusa.com/products/blowers-and-shredder-vacs/homeowner-blowers/bg56ce/		2

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29	Gardening Tools	Storage	Standard set	MISC VENDORS				variety of garden tools	2	
30	Dolly	Storage	Heavy Duty for moving equipment	Uline	Convertible Snr. Hand Truck Dolly	H-1364	http://www.uline.com/BL_1808/Uline-Convertible-Hand-Trucks?pricode=WU341&gadtype=pla&id=116537016082&gclid=CKXE8aDLwsUCFcqVfgodaCIAEw&gclid=aw.ds	(OR SIMILAR)	1	
31	TURNOUT GEAR #118									
32	Red Metal Lockers, Vented 45% and elevated off of floor.	Flight Gear and Turnout	24X24						16	
33	FLIGHT GEAR #135									
34	Open faced lockers/cabinets with top shelf for helmet storage	Flight Gear	24X24	All Wood Lockers	Straight Front Wood Lockers (or similar)		http://allwoodlockers.com/StraightFrontLockers.php	Color TBD	24	
35	BATTALION CHIEF DORM & OFFICE #103 & #104									
36	Portable battery chargers, rack & cabinet	Battalion Chief Dorm	Provided & Installed by SDFD/Communications							1
37	Chair & desk	Battalion Chief Dorm		BOSS	Double Plush Exec Swivel Chair	B8771S-BK	Arensons Furniture	Black	1	
38	Mattress w/ bedbug-resistant zip-up covers	Dorm Rooms	Xtra long twin size	Royal Mattress/Mattress Safe Covers	Twin XL traditional top deluxe Fire Station mattress set (mattress set, Item #: STF 2433 XL) with/ Softcover@ Ultimate Mattress Encasement- Twin Plus+ (Item #SC3977.5-U 9-15) and KleenCover@ 9" Stretch Knit Box Spring- Twin Plus+ (item # SKZ-TLT)		Royal Mattress/Mattress Safe Covers		1	
39	Nightstand	Battalion Chief Dorm							1	
40	TV/Computer Monitor	Battalion Chief Dorm	26" LCD	Vizio			Xerox	VIA CSD/SDFD	1	
41	Computer	Battalion Chief Office		HP		City Standard - HP_J5F10UC#ABA	Xerox	VIA CSD/SDFD	1	
42	Phone	Battalion Chief Office	Provided & Installed by SDFD/Communications							1
43	Printer/Scanner/Fax	Battalion Chief Office	Combination	HP			Xerox	VIA CSD/SDFD	1	
44	TV/Computer Monitor	Battalion Chief Office	26" LCD	Vizio			Xerox	VIA CSD/SDFD	2	
45	Chair & desk	Battalion Chief Office							1	
46	Office chair	Battalion Chief Office							6	
47	File Cabinets	Battalion Chief Office	4-drawer laterals (1 locking)				Office Depot or Staples		2	
48	OFFICES #121, #122 & #123									
49	Printer/Copier/Fax	Ready Response	all in one desktop (fax/printer/copier) network capable	Std. Electronics / Xerox				VIA CSD/SDFD	1	
50	Desk Chairs	Ready Response		Arenson's	Task Chair	Armless Office chairs with soft wheel castors.		BC 42-piano 6R3 Symphony piano # 3v20	9	

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51	Office Supplies	Ready Response	paper, pens, clips, file folders, etc.				Office Depot or Staples		TBD
52	TV/Computer Monitor	Ready Response	26" LCD	Vizio			Xerox	VIA CSD/SDFD	6
53	Computer - Desktop	Ready Response		HP		City Standard - HP_J5F10UC#ABA	Std. Electronics/Xerox	VIA CSD/SDFD	3
54	WATCH OFFICE #102								
55	Printer/Copier/Fax	Ready Response	all in one desktop (fax/printer/copier) network capable	Std. Electronics / Xerox				VIA CSD/SDFD	1
56	Desk Chairs	Ready Response		Arenson's	Task Chair	Armless Office chairs with soft wheel castors. May consider the same style chair with arms for office desks		BC 42-piano 6R3 Symphony piano # 3v20	9
57	Office Supplies	Ready Response	paper, pens, clips, file folders, etc.				Office Depot or Staples		TBD
58	Fire safe box	Ready Response	2 cubic feet	First Alert				2190DF	2
59	TV/Computer Monitor	Ready Response	26" LCD	Vizio			Xerox	VIA CSD/SDFD	6
60	Computer - Desktop	Ready Response		HP		City Standard - HP_J5F10UC#ABA	Std. Electronics/Xerox	VIA CSD/SDFD	3
61	TRAINING ROOM #137								
62	TV trays	Training Room	2 sets of 4	Coaster	Plankwood TV Tray				3
63	Recliner chairs	Training Room		Lazy Boy	Lancer Reclina-Rocker Leather Dark Brown			LazyBoy Mission Valley Bonnie 619-209-3690	11
64	Flat Screen TV/With mount	Training Room	LCD 54" Minimum	Vizio/Samsung					1
65	DVD Player, Laptop	Training Room	Computer Applications for Training & Presentations					<u>Coordinate w/ City IT</u>	1
66	DORM ROOMS #107, 109, 111, 113, 125, 126, 127 & 128								
67	Chair	Firefighter Dorms		OfficeMaster	Task Chair with soft wheel castors	BC42-PIANO with CAS0065-S	Arensons Furniture	Armless Chairs	6
68	Desk	Firefighter Dorms							6
69	Nightstand	Firefighter Dorms							9
70	Metal Bed Frames/With rollers	Dorm Rooms		Granger	Rollar Bed frame	Item # 66HA3 Model # SP33R	Granger	Rollars on the frames	9
71	TV Mounts for all rooms	Firefighter Dorm	LCD 26" - Wall Mounted	Vizio or Samsung					9
72	Mattress w/ bedbug-resistant zip-up covers	Dorm Rooms	Xtra long twin size	Royal Mattress/Mattress Safe Covers	Twin XL traditional top deluxe Fire Station mattress set (mattress set, Item #: STF 2433 XL) with/ Softcover® Ultimate Mattress Encasement- Twin Plus+ (Item #SC3977.5-U 9-15) and KleenCover® 9" Stretch Knit Box Spring- Twin Plus+ (item # SKZ-TLT)		Royal Mattress/Mattress Safe Covers		9

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73	Bedspreads	All dorms	Xtra long twin size	Xtra long twin size	Shamrock II Ribbed Bedspread Royal Blue			Costco #128431	9	
74	KITCHEN & OUTDOOR PATIO #133 & #134									
75	Kitchen Table	Dining Room	TBD		Kitchen table				1	
76	Kitchen Chairs Same as the dorms Armless	Kitchen							12	
77	Ready Kitchen	Kitchen	SEE "READY KITCHEN" LIST << ATTACHMENT 1.1 >>							1
78	Blender	Kitchen						Amazon	1	
79	Toaster/4 Slot	Kitchen						Amazon	1	
80	Coffee Maker	Kitchen		BUNN	BUNN33200.0015 VPR Black 12 cup pour over coffee brewer with 2 SS decantors.	2.34332E+11		Bunn	1	
81	Handle, Street	Kitchen							1	
82	Soap, Cascape	Kitchen						Amazon		
83	Cast iron dutch over 7 qt	Kitchen						Amazon	4	
84	Cast iron dutch over 9 qt	Kitchen						Amazon	4	
85	Cast iron skillet w/lid 9"	Kitchen						Amazon	2	
86	Cast iron skillet w/lid 12"	Kitchen						Amazon	2	
87	Cast iron skillet w/lid 13.25"	Kitchen						Amazon	2	
88	Pan, frying 14"	Kitchen						Amazon	2	
89	Pan, saute, 5 qt	Kitchen						Amazon	2	
90	Pan, saute, 7 qt	Kitchen						Amazon	2	
91	Pot 1qt with lid	Kitchen						Amazon	2	
92	Pot 4 qt with lid	Kitchen						Amazon	2	
93	Pot 10 qt with lid	Kitchen						Amazon	2	
94	Pot 20 qt with lid	Kitchen						Amazon	1	
95	Colander, Alum 3 qt	Kitchen						Amazon	1	
96	Egg Slicer	Kitchen						Amazon	1	
97	Potato masher	Kitchen						Amazon	1	
98	Ice cream scoop	Kitchen						Amazon	2	
99	Spatula metal assorted sizes	Kitchen						Amazon	6	
100	Spatula plastic assorted sizes	Kitchen						Amazon	6	
101	Ladle assorted sizes	Kitchen						Amazon	1	

	B	C	D	F	G	H	I	J	K
1	Master List for AirOps								
2	Furniture, Fixtures & Equipment								
3									
4									
5	Description	Location	Size	Manufacturer	Product Name	Product Number	Web Link	Fabric/Notes/Options	Qty
102	Thermometer cooking	Kitchen						Amazon	1
103	Large rolling pin	Kitchen						Amazon	1
104	Measuring cup .24, .33, .5, .75, 1 cup	Kitchen						Amazon	1
105	Tongs assorted sizes	Kitchen						Amazon	3
106	Meat tenderizer	Kitchen						Amazon	1
107	Plates 6"	Kitchen						Amazon	30
108	MAJOR APPLIANCES								
109	Wolf commercial stove	Kitchen	Resturant Range 60"	Wolf	Challenger XL 60" gas	Wolf - C60SS-6B24G	Wolf Ranges	Has a 24" griddle and high back splash with shelf	1
110	Kenmore Refrigerator white or SS	Kitchen	23.8 to 25 cu. Ft.	Kenmore	Kenmorebottom freezer		Kenmore.com	Bottom freezer	1
111	Kenmore Refrigerator White or SS	Kitchen	23.8 to 25 cu. Ft.	Kenmore	Kenmore Top-Freezer refrigerator	79432	Kenmore.com	Top freezers/ white or stainless steel, verify color	3
112	Microwave oven	Kitchen						Aztec Appliance	1
113	Ice maker machine	Storage room with a floor sink	193-lb/Day Air Cooled Undercounter Half Size Cube Ice Maker w/90-lb Bin, 115v	Manitowoc	Half Size Ice Cube Maker	UY-0190A Neo 26	https://www.restaurantsupply.com/manitowoc-uy-0190a/		1
114	CONFERENCE #132								
115	Conference Table	Conference	TBD		Conference table				1
116	Chairs Same as the dorms Armless	Conference							10
117	EXERCISE ROOM #138								
118	Flat Screen TV	Exercise Room	LCD 36" Wall Mounted	Vizio or Samsung					1
119	Stereo w/ speakers	Exercise Room	MP3, AM/FM compatible		Provided by SDFD - Sport's Club				1
120	Fan	Exercise Room		Continental Dynamics	CD Premium 24 Inch Non Oscillating Pedestal Fan 1/3 HP TEFC Motor, 10,200 CFM	WB292650	http://www.globalindustrial.com/p/hvac/fans/pedestal/cd-premium-24-non-oscillating-pedestal-fan-1-3-hp-10-200-cfm		1
121	Floor Mats	Exercise Room	Entire exercise room floor, 3/8 rubber flooring and up the walls 12 to 18"	Everlast	ecore		Fitnesswarehouse San Diego		
122	Gym w/ smith	Exercise Room		Tuffstuff	TuffStuff CXT-200 Gym w/ smith		www.fitnesswarehouseusa.com		1
123	Bike	Exercise Room		TRUE	True CS200 Bike		www.fitnesswarehouseusa.com	Or Equivalent	2
124	Elliptical	Exercise Room		TRUE	True CS200 Elliptical		www.fitnesswarehouseusa.com	Or Equivalent	1
125	FreeClimber	Exercise Room		Stairmaster	Stairmaster FreeClimber		www.fitnesswarehouseusa.com	Or Equivalent	1
126	TuffStuff AP-71MP Multi press	Exercise Room		Tuffstuff	TuffStuff AP-71MP Multi press		www.fitnesswarehouseusa.com		1

	B	C	D	F	G	H	I	J	K
1	Master List for AirOps								
2	Furniture, Fixtures & Equipment								
3									
4									
5	Description	Location	Size	Manufacturer	Product Name	Product Number	Web Link	Fabric/Notes/Options	Qty
127	Oly Bench	Exercise Room		Tuffstuff	TS COB-400 Oly Bench		www.fitnesswarehouseusa.com		1
128	Hyper Extension	Exercise Room		Tuffstuff	TS CHE-340 Hyper Extension		www.fitnesswarehouseusa.com		1
129	Multi Bench	Exercise Room		Tuffstuff	TS CMB-375 Multi Bench		www.fitnesswarehouseusa.com		1
130	Vert Knee Raise	Exercise Room		Tuffstuff	TS CVR-341 Vert Knee Raise		www.fitnesswarehouseusa.com		1
131	Dumbbell set 5-70lb	Exercise Room			Dumbbell set 5-70lb		www.fitnesswarehouseusa.com		1
132	Dumbbell Rack	Exercise Room			DB Rack		www.fitnesswarehouseusa.com		1
133	340lbs Rubber Grip Plates	Exercise Room			340lbs Rubber Grip Plates		www.fitnesswarehouseusa.com		1
134	Plate Tree	Exercise Room		APO	APO- Plate Tree		www.fitnesswarehouseusa.com		1
135	BATHROOMS #105, 108, 110, 112, 114, 124, 129 & 130								
136	MISC Bath Supplies/Items	All bathrooms	N/A	N/A (MISC MANUF.)	Toilet plunger, brushes & cleaning supplies/ shower curtains.	N/A		6 trash cans to fit inside of cabinets & 3 on th	9
137	Shower no-slip mats	All bathrooms	16" x 35"	Blue Rock	Shower Mat				7
138	READY RESPONSE #136								
139	Printer/Copier/Fax	Ready Response	all in one desktop (fax/printer/copier) network capable	Std. Electronics / Xerox				VIA CSD/SDFD	1
140	Desk Chairs	Ready Response		Arenson's	Task Chair	office chairs with soft wheel castors.		BC 42-piano 6R3 Symphony piano # 3v2	4
141	Office Supplies	Ready Response	paper, pens, clips, file folders, etc.				Office Depot or Staples		TBD
142	Fire safe box	Ready Response	2 cubic feet	First Alert				2190DF	2
143	TV/Computer Monitor	Ready Response	26" LCD	Vizio			Xerox	VIA CSD/SDFD	4
144	Computer - Desktop	Ready Response		HP		City Standard - HP_J5F10UC#ABA	Std. Electronics/Xerox	VIA CSD/SDFD	2
145	Wall Mounted Swivel Map Display System	Ready Response (Hallway)	32" x 48" - 6 Panel System				https://www.digitalpro.ca/display_solutions.html		1
146	WORK ROOM / MISC / THROUGHOUT STATION								
147	File Cabinets/ G/M Interiors	TBD	Verticals	Verticals					TBD
148	Security Camera & Monitors	TBD					Std. Electronics/Xerox	VIA CSD/SDFD	TBD
149	Network Equipment	TBD					Std. Electronics/Xerox	VIA CSD/SDFD	TBD
150	File Cabinets - Lockable 5- vertical drawer	Workstation	Lockable 5- vertical drawer	Office Depot/White					1
151	Cork board	Throughout station	36" x 24"				Office Depot or Staples		2
152	White board	Throughout station	5'x8' or 4'x6'				Office Depot or Staples		2

	B	C	D	F	G	H	I	J	K
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2	Furniture, Fixtures & Equipment								
3									
4									
5	Description	Location	Size	Manufacturer	Product Name	Product Number	Web Link	Fabric/Notes/Options	Qty
153	Clocks	Throughout station	13" Round				Office Depot or Staples	#336509	4
154	Larger recycle container	Rm. 202	20gal or 30	Rubbermaid					1
155	Trash & Recycling containers	Throughout station	7 gallon	Rubbermaid	City of San Diego Std		City of SD Storeroom		6
156	Plant Fertilizers	Throughout station	2 bags of fertilizer-ext'r shed	Rubbermaid		XL Deck Box 5e39			1
157	AED/Automatic External Defibrillator	TBD							2
158	PHASE II - HANGAR								
159	Window washing equipment	Hangar	Pole w/ extention, mop, squeegee	JL	Window Cleaning Bucket Kit	807820WC-KIT	https://www.janilink.com/product_info.php?products_id=15946&source=googlepls&qclid=CLmkt4DAwsUCFYOTfgodXzYA6w		2
160	Power Washer	Hangar	2000psi	Karcher		K5.68			2
161	Wall Map Backer & Frame	Hangar	12 feet wide by 10 feet tall					Smooth Ply Backerboard w/ Trimwork	1
162	Work Bench	Hangar	96"x25"	Gladiator	Premier Series	GAWB08BAZG	http://www.homedepot.com/p/Gladiator-Premier-Series-96-in-w-x-25-in-D-Bamboo-Top-Adjustable-Height-Workbench-GAWB08BAZG/204246910		1
163	Step Ladder	Hangar	6FT. Fiberglass	Werner	fiberglass, commercial grade	6206			1
164	Giant Floor Fan	Hangar	42 Inch	Max Air Pro	MaxxAir 42 in Industrial	BF42BDORGPRO	HOME DEPOT		1
165	14 ft. A Frame ladder	Hangar	14FT. Aluminum or Fiberglass	Werner	14ft A-Frame Ladder	T7414		(OR SIMILAR)	1
166	Extension ladder	Hangar	20' Ext. Ladder - 300lbs Max	Werner	extension ladder	D6220-3		(OR SIMILAR)	2
167	Ice maker machine	Storage room with a floor sink	193-lb/Day Air Cooled Undercounter Half Size Cube Ice Maker w/90-lb Bin, 115v	Manitowoc	Half Size Ice Cube Maker	UY-0190A Neo 26	https://www.restaurantsupply.com/manitowoc-uy-0190a/		1
168	Red Metal Lockers, Vented 45% and elevated off of floor.	Hangar	24X24						
169	Red Hazmat Locker for flammables	Hangar	60 Gal	Eagle/JUSTRITE/SECUREALL (OR SIMILAR)	SecureAll	8UKV4		(OR SIMILAR)	1
170	Retractable Reeled Extention Cords	Hangar	50-feet	U-Line	All Purpose Extension Cord and Reel	S-19879	http://www.uline.com/Product/Detail/S-19879/Extension-Cords-Surge-Protectors/All-Purpose-Extension-Cord-and-Reel-50?pricode=WY596&gadtype=pla&id=S-19879&qclid=CPrB4JHFwsUCFU9ffg odP4UACA&gclsrc=aw.ds	Near work bench	2
171	Wet-Dry Vacuum	Hangar	6 Gallon Min	Shop Vac					1

ATTACHMENT F
INTENTIONALLY LEFT BLANK

ATTACHMENT G
CONTRACT AGREEMENT

CONTRACT AGREEMENT

CONSTRUCTION CONTRACT

This contract is made and entered into between THE CITY OF SAN DIEGO, a municipal corporation, herein called "City", and EC Constructors Inc., herein called "Contractor" for construction of **Fire Rescue Air Operations Facility**; Bid No.**K-18-1732-DBB-3**; in the amount of **Three Million Two Hundred Fourteen Thousand Five Hundred Forty Four Dollars and Zero Cents (\$3,214,544.00)**, which is comprised of the Base Bid.

IN CONSIDERATION of the payments to be made hereunder and the mutual undertakings of the parties hereto, City and Contractor 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 Instruction to Bidders and the Supplementary Special Provisions (SSP).
 - (d) That certain documents entitled **Fire Rescue Air Operations Facility**, on file in the office of the **Public Works Department** as Document No. **S-15012**, 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 Rescue Air Operations Facility**, Bid Number **S-15012**, San Diego, California.
3. For such performances, the City 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 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.
5. This contract is effective as of the date that the Mayor or designee signs the agreement.

CONTRACT AGREEMENT (continued)

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

THE CITY OF SAN DIEGO

APPROVED AS TO FORM

Mara W. Elliott, City Attorney

By 

By 

Print Name: Stephen Samara
Principal Contract Specialist
Public Works Department

Print Name: Pedro DeLara, Jr.
Deputy City Attorney

Date: 8/23/2018

Date: 8/24/18

CONTRACTOR

By 

Print Name: James J. Summers

Title: President

Date: 6/19/18

City of San Diego License No.: B2012044182

State Contractor's License No.: 585677

DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) REGISTRATION NUMBER: 1000004249

CERTIFICATIONS AND FORMS

The Bidder / Proposer, by submitting its electronic bid or proposal, agrees to and certifies under penalty of perjury under the laws of the State of California, that the certifications, forms and affidavits submitted as part of this submission are true and correct.

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.

**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

County of San Diego

The bidder, being first duly sworn, deposes and says that he or she is authorized by 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.

CONTRACTOR CERTIFICATION

DRUG-FREE WORKPLACE

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;

This company_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.

CONTRACTOR CERTIFICATION

AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE CERTIFICATION

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:

This company 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.

CONTRACTOR CERTIFICATION

CONTRACTOR STANDARDS – PLEDGE OF COMPLIANCE

I declare under penalty of perjury that I am authorized to make this certification on behalf of the company submitting this bid/proposal, that as Contractor, 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 has completed a Pledge of Compliance attesting under penalty of perjury of having complied with City of San Diego Municipal Code § 22.3004.

CONTRACTOR CERTIFICATION

EQUAL BENEFITS ORDINANCE CERTIFICATION

I declare under penalty of perjury that I am familiar with the requirements of and in compliance with the City of San Diego Municipal Code § 22.4300 regarding Equal Benefits Ordinance.

CONTRACTOR CERTIFICATION

EQUAL PAY ORDINANCE CERTIFICATION

Contractor shall comply with the Equal Pay Ordinance (EPO) codified in the San Diego Municipal Code (SDMC) at section 22.4801 through 22.4809, unless compliance is not required based on an exception listed in SDMC section 22.4804.

Contractor shall require all of its subcontractors to certify compliance with the EPO in their written subcontracts.

Contractor must post a notice informing its employees of their rights under the EPO in the workplace or job site.

By signing this Contract with the City of San Diego, Contractor acknowledges the EPO requirements and pledges ongoing compliance with the requirements of SDMC Division 48, section 22.4801 et seq., throughout the duration of this Contract.

AFFIDAVIT OF DISPOSAL

(To be submitted upon completion of Construction pursuant to the contracts Certificate of Completion)

WHEREAS, on the _____ DAY OF _____, 2_____ the undersigned entered into and executed a contract with the City of San Diego, a municipal corporation, for:

Fire Rescue Air Operations Facility

(Name of Project or Task)

as particularly described in said contract and identified as Bid No. **K-18-1732-DBB-3**; SAP No. (WBS/IO/CC) **S-15012**; 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 City of San Diego 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

LIST OF SUBCONTRACTORS

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS FOR FURTHER INFORMATION**

In accordance with the requirements of the "Subletting and Subcontracting Fair Practices Act", Section 4100, of the California Public Contract Code (PCC), the Bidder is to list below the name, address and license number of each Subcontractor who will perform work, labor, render services or specially fabricate and install a portion [type] of the work or improvement, in an amount of or in excess of 0.5% of the Contractor's total Bid. Failure to comply with this requirement may result in the Bid being rejected as non-responsive. The Contractor is to list only one Subcontractor for each portion of the Work. The Bidder's attention is directed to the Special Provisions - General; Paragraph 2-3 Subcontracts, which stipulates the percentage of the Work to be performed with the Bidder's own forces. The Bidder is to also list all SLBE, ELBE, DBE, DVBE, MBE, WBE, OBE, SDB, WoSB, HUBZone, and SDVOSB Subcontractors for which the Bidders are seeking recognition towards achieving any mandatory, voluntary, or both subcontracting participation percentages.

NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	DIR Registration Number	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB [Ⓞ]	WHERE CERTIFIED [Ⓜ]	CHECK IF JOINT VENTURE PARTNERSHIP
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____								
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		
- Ⓜ 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		
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.

NAMED EQUIPMENT/MATERIAL SUPPLIER LIST

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS FOR FURTHER INFORMATION**

NAME, ADDRESS AND TELEPHONE NUMBER OF VENDOR/SUPPLIER	DIR Registration Number	MATERIALS OR SUPPLIES	DOLLAR VALUE OF MATERIAL OR SUPPLIES	SUPPLIER (Yes/No)	MANUFACTURER (Yes/No)	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB ^①	WHERE CERTIFIED ^②
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							
Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____							

- ① As appropriate, Bidder shall identify Vendor/Supplier 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 Vendor/Supplier is certified by:
- | | | | |
|--|--------|--|----------|
| City of San Diego | CITY | State of California Department of Transportation | CALTRANS |
| California Public Utilities Commission | CPUC | | |
| 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.

SUBCONTRACTORS ADDITIVE/DEDUCTIVE ALTERNATE (USE ONLY WHEN ADDITIVE ALTERNATES ARE REQUIRED)

***** PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY *** TO BE SUBMITTED IN ELECTRONIC FORMAT ONLY *** SEE INSTRUCTIONS TO BIDDERS, FOR FURTHER INFORMATION**

ADDITIVE/ DEDUCTIVE ALTERNATE	NAME, ADDRESS AND TELEPHONE NUMBER OF SUBCONTRACTOR	DIR Registration Number	CONSTRUCTOR OR DESIGNER	SUBCONTRACTOR LICENSE NUMBER	TYPE OF WORK	DOLLAR VALUE OF SUBCONTRACT	MBE, WBE, DBE, DVBE, OBE, ELBE, SLBE, SDB, WoSB, HUBZone, OR SDVOSB ^①	WHERE CERTIFIED ②	CHECK IF JOINT VENTURE PARTNER SHIP
	Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____ Email: _____								
	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 | 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.

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

- A. BID BOND – See Instructions to Bidders, Bidders Guarantee of Good Faith (Bid Security) for further instructions**

- B. CONTRACTOR’S CERTIFICATION OF PENDING ACTIONS**

Bids will not be accepted until ALL the above-named forms are submitted as part of the bid submittal

BID BOND

**See Instructions to Bidders, Bidder Guarantee of Good Faith
(Bid Security)**

KNOW ALL MEN BY THESE PRESENTS,

That EC Constructors, Inc. as Principal, and
Hartford Fire 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 Rescue Air Operations Facility


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 14th day of May, 2018

EC Constructors, Inc. (SEAL)
(Principal)

Hartford Fire Insurance Company (SEAL)
(Surety)

By: 
Sherri L. Summers, CEO
(Signature)

By: 
Lawrence F. McMahon, Attorney-in-Fact
(Signature)

(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 MAY 14 2018 before me, Rachel A. Mullen, Notary Public,
Date Insert Name of Notary exactly as it appears on the official seal

personally appeared Lawrence F. McMahon
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 Rachel A. Mullen
Signature of Notary Public Rachel A. Mullen

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of the form to another 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: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____

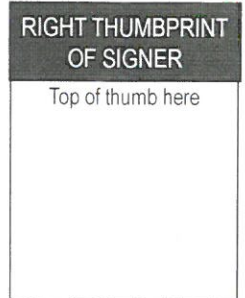


Signer is Representing: _____

Surety Company

Signer's Name: _____

- Individual
- Corporate Officer — Title(s): _____
- Partner Limited General
- Attorney in Fact
- Trustee
- Guardian or Conservator
- Other: _____



Signer is Representing: _____

POWER OF ATTORNEY

Direct Inquiries/Claims to:

THE HARTFORD

BOND, T-4

One Hartford Plaza

Hartford, Connecticut 06155

call: 888-266-3488 or fax: 860-757-5835

Agency Code: 72-160200

KNOW ALL PERSONS BY THESE PRESENTS THAT:

- Hartford Fire Insurance Company, a corporation duly organized under the laws of the State of Connecticut
- Hartford Casualty Insurance Company, a corporation duly organized under the laws of the State of Indiana
- Hartford Accident and Indemnity Company, a corporation duly organized under the laws of the State of Connecticut
- Hartford Underwriters Insurance Company, a corporation duly organized under the laws of the State of Connecticut
- Twin City Fire Insurance Company, a corporation duly organized under the laws of the State of Indiana
- Hartford Insurance Company of Illinois, a corporation duly organized under the laws of the State of Illinois
- Hartford Insurance Company of the Midwest, a corporation duly organized under the laws of the State of Indiana
- Hartford Insurance Company of the Southeast, a corporation duly organized under the laws of the State of Florida

having their home office in Hartford, Connecticut, (hereinafter collectively referred to as the "Companies") do hereby make, constitute and appoint, **up to the amount of unlimited:**

Lawrence F. McMahon, James Baldassare Jr., Sarah Myers, Maria Guise, Lilia Robinson, Charlotte Aquino, Jennifer L. Clampert, Janice Martin
of
San Diego, CA

their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety(ies) only as delineated above by , and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof, on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, and as authorized by a Resolution of the Board of Directors of the Companies on August 1, 2009 the Companies have caused these presents to be signed by its Vice President and its corporate seals to be hereto affixed, duly attested by its Assistant Secretary. Further, pursuant to Resolution of the Board of Directors of the Companies, the Companies hereby unambiguously affirm that they are and will be bound by any mechanically applied signatures applied to this Power of Attorney.



Wesley W. Cowling

Wesley W. Cowling, Assistant Secretary

M. Ross Fisher

M. Ross Fisher, Vice President

STATE OF CONNECTICUT }
COUNTY OF HARTFORD } ss. Hartford

On this 12th day of July, 2012, before me personally came M. Ross Fisher, to me known, who being by me duly sworn, did depose and say: that he resides in the County of Hartford, State of Connecticut; that he is the Vice President of the Companies, the corporations described in and which executed the above instrument; that he knows the seals of the said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed by authority of the Boards of Directors of said corporations and that he signed his name thereto by like authority.



CERTIFICATE

Kathleen T. Maynard

Kathleen T. Maynard
Notary Public

My Commission Expires July 31, 2016

I, the undersigned, Vice President of the Companies, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is still in full force effective as of
Signed and sealed at the City of Hartford. May 14, 2018



Gary W. Stumper

Gary W. Stumper, Vice President

CONTRACTOR'S 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.

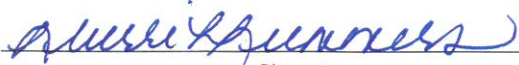
CHECK ONE BOX ONLY.

- 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: EC Constructors, Inc.- Sherri L. Summers, CEO

Certified By Sherri L. Summers Title CEO
Name

 Date 5-17-18
Signature

USE ADDITIONAL FORMS AS NECESSARY

ENGINEER OF WORK

The engineering Specifications and Special Provisions contained herein have been prepared by or under the direction of the following Registered Architect:


1) Registered Architect

17 MAY 2018
Date

Seal:




2) For City Engineer

5/11/18
Date

Seal

60990

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. A new set of plans for **TEMPORARY FACILITY** using the same drawings number is included in this Addendum.

C. BIDDER'S QUESTIONS

Q1. TPO membrane color: Spec. section 2.2.A calls for 80 mil fabric-backed Gray TPO membrane and Spec. section 2.1.E calls to meet initial solar reflectance and emissivity. However, most TPO manufacturers Grey membrane do not meet 2.1.E. Would you consider white TPO membrane?

A1. White membrane is acceptable.

Q2. Vapor Barrier: Detail 2/A9.2 and Spec. Sec. 3.5 call for vapor barrier/slip sheet between cover board and roof membrane. Could you please provide type of vapor barrier/slip sheet?

A2. Fully adhered is okay (insulation / membrane)

Q3. Vapor Barrier Location: Can Vapor Barrier per 2/A9.2 and slip sheet from Spec. Sec. 3.5 be located directly over plywood deck? If so, we can us SA vapor barrier and use adhesive for cover board and membrane so there's no penetrations. Please advise.

A3. Vapor barrier should be between the roof deck and insulation.

Q4. Walkway locations and quantity: Spec. Sec. 3.8.A.1 shows locations of walk ways however, nothing on roof plan (A1.9). Could you please provide location/lay out of the walk ways for bidding purpose? Therefore, we all have same quantity of walk ways.

A4. Walkway layout- should be from roof access location to and around all service units on roof. (heavy duty walkmat) – See Item E, drawing 39665-16-D (A1.9), page 12 of this Addendum.

- Q5. TPO membrane: Can TPO membrane be regular/smooth membrane in lieu of fabric-baked membrane?
- A5. Use fabric (fleece back) membrane.
- Q6. Could you please provide a length of Installer's warranty? The spec. only indicates manufacturer's warranty.
- A6. Installers warranty to be 5 years.
- Q7. Is it possible to provide revised spec. based on above questions?
- A7. Use answers to questions 1-6 provided above.
- Q8. Cant Strip: Details 1,4 & 7/A9.5 show cant strip, however the cant strip is not required for TPO roofing system. Please confirm that cant strip is not required for this project.
- A8. Cant strip is required per drawings.
- Q9. Scupper metal: The detail 8/A9.5 indicates 22 GA Galv. Metal scupper at scupper locations. We cannot make water tight 24 ga metal and must be fabricated out of TPO coated metal. Please confirm.
- A9. Yes - TPO clad metal will be required for all scuppers / embedded metal.
- Q10. Section 9-3.1 "Measurement and Payment" item #4 talks about a commercial coach and a sprung structure. There is no mention of this on the drawings. Please clarify and provide requirements for a Coach and Sprung Structure.
- A10. See ASI issued for trailer (Set plan Temporary Facility) of this addendum.
- Q11. The detail shown on the plans G1.2 for the flagpole will not pass CA code nor do flag manufactures make a pole with those specs anymore. It must be an old detail.
- A11. Omit detail 13/G1.2. Refer to detail 12/S-701 and specifications
- Q12. The window schedule on page A6.1 of the plans dated 04/06/18 calls out Hollow Metal frames for all the windows. Is this correct? I see in the specs there are aluminum windows "Kawneer Company; Product 8400 TL Isolock", please clarify.

- A12. See Item E, drawing 39665-31-D (A6.1), page 14 of this Addendum.
- Q13. On page A1.5 the west window is listed as a "type B" but on page A4.0 it is listed as a "type a". Can you please confirm which type it should be?
- A13. Window "type B" as shown on A1.5.
- Q14. I don't see a Section 08 8000 – Glazing in the specs. I see under the aluminum windows they are calling out dual glaze w/ low-e, but I don't see the glass called out for door types #2, #3 (sidelite), #5, or #6 (door and sidelites).
- A14. Glazing at interior doors to be ¼" plate tempered where required.
- Q15. Keynote 31 on A2.4 calls out rubber flooring to go up 30" on the walls of exercise room 138. I1.0 calls for 4" base in this room. Please confirm which base is required for room 138. Thank you.
- A15. Omit reference to 4" base at exercise room. 30" intergral flooring to continue on wall.
- Q16. Page 134 section 2.2 line 3 calls out 80mil felt back. Drawing show 90mil. 90 mil does not exist. Is 80mil felt back what you are looking for?
- A16. Roof membrane to be 80mil.
- Q17. Page 133 section 2.1 line E. Energy Star is only in the color White. Gray is spec'd out. What color do you want?
- A17. Roof membrane to be White.
- Q18. Page 133 section 2.1 line F. The energy performances list are for the color White and not Gray. Grays solar reflectance ranges from .32 to .35 depending on the manufacture, not .70 as listed in the specs. Which color do you want? If Gray is chosen will the lower performance numbers be acceptable?
- A18. Maintain performance spec'd using white membrane.
- Q19. There is lighting rods on the roof that are not on the plans. Are they being reinstall? If so, please show a detail for attachment to the PVC roof membrane and the coping metal.

- A19. Lighting rods to be removed and reinstalled per roof manufacturers specification.
- Q20. Is there a specific reason the plans are calling for an EST3 fire alarm panel. With the amount of devices we could use an EST i01000 panel for a substational cost savings. Please confirm if either model number can be used as long as they meet the requirements of the system.
- A20. Either model can be used so long as the project requirements are met.
- Q21. Given the dilapidated nature of the asphalt parking lot, does the city intend to replace the pavement at any point during this project?
- A21. No plans to replace during this project.
- Q22. Note 18 on sheet A2.1 calls for new exterior stucco, however, demo plan on A2.0 does not call for removal of stucco in same area. Does stucco need to be removed on all four elevation views? Please clarify.
- A22. No, this note is general. Stucco demolition is selective and to occur as needed for new opening and framing.
- Q23. Detail 4/A9.1 is missing a drawing. Please provide or confirm it is no longer required.
- A23. This detail is not used.
- Q24. Detail 4/A2.2, please confirm what backing is to be used for shelving. Do we use detail 6/A9.7 or the missing 4/A9.1 detail?
- A24. Used detail 6/A9.7 as drawn.
- Q25. Please confirm ceiling type for rooms 109 & 110. Drawing A4.1 calls them out as a 1-hour floor-ceiling separation, whereas A1.7 calls them out as suspended gyp. Board.
- A25. Reference detail 1&2 /A9.0. Ceiling types per plan.
- Q26. Sheet M3.1, please confirm the proper call outs. There are numbers on the sheet that aren't displayed on the legend (ie number 24 does exist on the legend and 23 doesn't exist on the drawing).
- A26. See Item E, drawing 39665-63-D (M3.1), page 15 of this Addendum.

Q27. Please confirm what the city would like to do with the lightning rods on the roof. Who is to perform the work and what is the complete scope.

A27. Lighting rods to be removed and reinstalled.

Q28. Please confirm what the city would like to do with the GPS antenna on the roof. Who is to perform the work and what is the complete scope.

A28. Contractor to remove and hand over to owner

Q29. Will an addressable fire alarm control panel by Notifier, (NFS-320), be acceptable as an equal substitute for the FACP shown in the Fire Alarm drawings?

A29. Yes.

Q30. At the job walk, it was stated that the trailer would be moved by the GC, will trailer utilities be provided by the City of San Diego?

A30. Contractor responsible for all utility connections. See ASI.

Q31. Who is the current company that services the fire alarms?

A31. Building owner will need to verify.

D. ATTACHMENT A

1. To Scope of Work, Item 1.1. page 21, **DELETE** in its entirety and **SUBSTITUTE** with the following:

1.1. The Work shall be performed in accordance with:

1.1.1 The Notice Inviting Bids and Plans **FIRE RESCUE AIR OPERATIONS FACILITY** numbered 39655-01-D through 39655-111-D, and **FIRE RESCUE AIR - TEMPORARY FACILITY** numbered 39665-01-D through 39665-20-D and reference drawings C-1, A-1, A-2 and A-3 inclusive.

E. SUPPLEMENTARY SPECIAL PROVISIONS

1. To Section 7, Responsibilities of the Contractor, Subsection 7-13.4 Contractor Standards and Pledge of Compliance, Item 4, page 44 **DELETE** in its entirety.

F. CERTIFICATIONS AND FORMS

1. To Electronically Submitted Forms, page 866, **DELETE** in its entirety and **SUBSTITUTE** with page 9 of this Addendum.
2. **ADD** Mandatory Disclosure of Business Interests Form, page 10 of this Addendum.

G. PLANS

1. To Drawing 39665-15-D (A1.8), 39665-16-D (A1.9), 39665-29-D (G1.0), 39665-31-D (A6.1)-and 39665-63-D (M3.1), **DELETE** in their entirety and **SUBSTITUTE** with pages 11 through 15 of this Addendum
2. To Plan set **FIRE RESCUE AIR – TEMPORARY FACILITY**, **ADD** Drawings 39665-01-D through 39665-20-D and reference drawings C-1, A-1, A-2 and A-3 with pages 16 through 39 of this Addendum.

James Nagelvoort, Director
Public Works Department

Dated: *May 11, 2018*
San Diego, California

JN/JB/SS

ELECTRONICALLY SUBMITTED FORMS

THE FOLLOWING FORMS MUST BE SUBMITTED IN PDF FORMAT WITH BID SUBMISSION

The following forms are to be completed by the bidder and submitted (uploaded) electronically with the bid in PlanetBids.

- A. BID BOND – See Instructions to Bidders, Bidders Guarantee of Good Faith (Bid Security) for further instructions**
- B. CONTRACTOR'S CERTIFICATION OF PENDING ACTIONS**
- C. MANDATORY DISCLOSURE OF BUSINESS INTERESTS FORM**

Bids will not be accepted until ALL the above-named forms are submitted as part of the bid submittal

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

Legal Name	DBA		
Street Address	City	State	Zip
Contact Person, Title	Phone	Fax	

Provide the name, identity, and precise nature of the interest* of all persons who are directly or indirectly involved** in this proposed transaction (SDMC § 21.0103).

* The precise nature of the interest includes:

- the percentage ownership interest in a party to the transaction,
- the percentage ownership interest in any firm, corporation, or partnership that will receive funds from the transaction,
- the value of any financial interest in the transaction,
- any contingent interest in the transaction and the value of such interest should the contingency be satisfied, and
- any philanthropic, scientific, artistic, or property interest in the transaction.

** Directly or indirectly involved means pursuing the transaction by:

- communicating or negotiating with City officers or employees,
- submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City, or
- directing or supervising the actions of persons engaged in the above activity.

Name	Title/Position
City and State of Residence	Employer (if different than Bidder/Proposer)
Interest in the transaction	

Name	Title/Position
City and State of Residence	Employer (if different than Bidder/Proposer)
Interest in the transaction	

*** Use Additional Pages if Necessary ***

Under penalty of perjury under the laws of the State of California, I certify that I am responsible for the completeness and accuracy of the responses contained herein, and that all information provided is true, full and complete to the best of my knowledge and belief. I agree to provide written notice to the Mayor or Designee within five (5) business days if, at any time, I learn that any portion of this Mandatory Disclosure of Business Interests Form requires an updated response. Failure to timely provide the Mayor or Designee with written notice is grounds for Contract termination.

Print Name, Title

Signature

Date

Failure to sign and submit this form with the bid/proposal shall make the bid/proposal non-responsive. In the case of an informal solicitation, the contract will not be awarded unless a signed and completed Mandatory Disclosure of Business Interests Form is submitted.

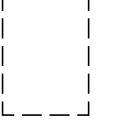

GENERAL NOTES

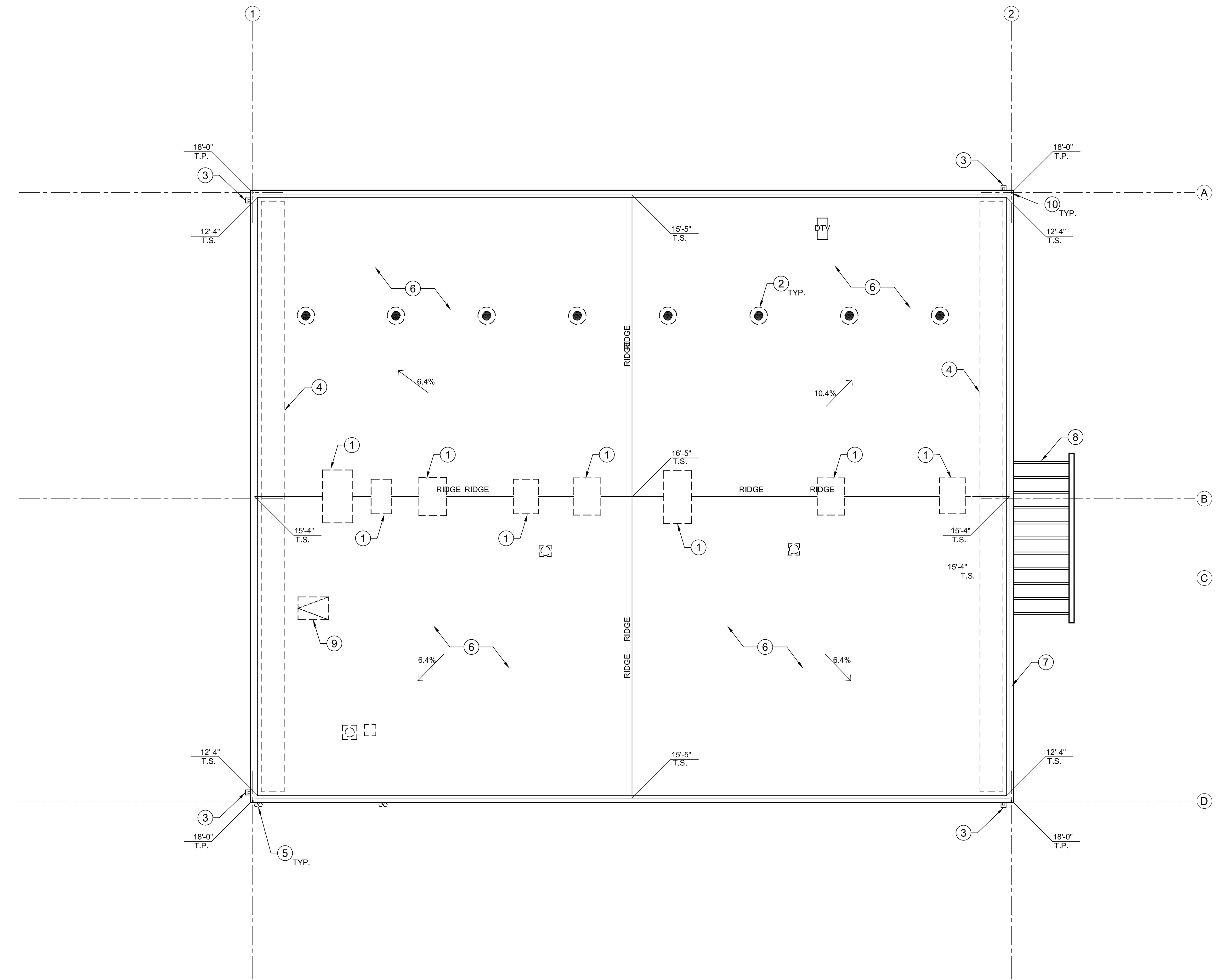
1. NOTIFY ARCHITECT FOR SITE VISIT WHEN FRAMING TO BE REMOVED IS EXPOSED.
2. PRIOR TO ANY DEMOLITION, NOTIFY OWNER 72 HOURS IN ADVANCE.
3. SAFE-OFF ALL UTILITIES PRIOR TO ANY DEMOLITION.
4. REFER TO ELECTRICAL & MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
5. CONTRACTOR TO VERIFY ALL EQUIPMENT AND SYSTEMS IN FIELD.
6. CONTRACTOR RESPONSIBLE FOR THE REMOVAL AND LEGAL DISPOSAL OF ALL DEMOLISHED MATERIAL.

KEY NOTES

- (E) ROOF TOP EQUIPMENT TO BE REMOVED, SEE MECHANICAL DRAWINGS. - INFILL OPENINGS PER STRUCTURAL.
- (E) ANTENNA MOUNTS TO BE REMOVED.
- (E) 8"x8"x24 GA. SCUPPER THROUGH WALL WITH 24 GA. DOWNSPOUT TO BE REMOVED. MODIFY PER NEW ROOF PLAN.
- (E) PLYWOOD TO BE REMOVED. SEE STRUCTURAL DWGS.
- (E) CONDUIT TO BE REMOVED. SEE ELECTRICAL DWGS.
- (E) BUILT UP ROOF ASSEMBLY TO BE REMOVED. PREP FOR (N) 90 MIL. TPO ROOF. PER PLAN /SPECIFICATIONS.
- (E) PARAPET CAP TO BE REMOVED.
- (E) WOOD TRELLIS TO REMAIN.
- (E) ROOF HATCH TO BE REMOVED.
- (E) LIGHTING RODS TO BE REMOVED AND REINSTALLED.

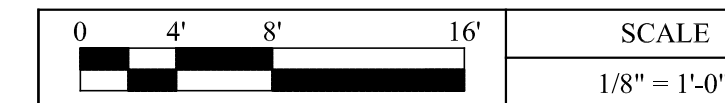
LEGEND

-  (E) AC UNIT TO BE REMOVED. INFILL OPENING. SEE NEW ROOF PLAN FOR ADDITIONAL INFORMATION.
-  (E) ANTENNA MOUNTS
- T.P. TOP OF PARAPET
- T.S. TOP OF SHEATHING



DEMO ROOF PLAN

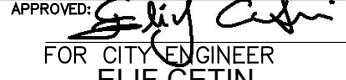
TRUE NORTH PLAN NORTH



A1.8

PLANS FOR THE CONSTRUCTION OF
FIRE RESCUE AIR OPS FACILITY
DEMOLITION ROOF PLAN

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 15 OF 111 SHEETS

APPROVED: 	DATE: 5/9/2018	SUBMITTED BY: JIHAD SLEIMAN
FOR CITY ENGINEER: ELIF CETIN	DATE: C60990	PROJECT MANAGER
PRINT DCE NAME: _____	RCE# _____	CHECKED BY: JAMES BOTICA
DESCRIPTION	BY	APPROVED
75% CD	MV/RA	
90% CD	MV/RA	
100% CD	MV/RA	09/22/17
ADDENDUM A	RA	05/09/18
DATE STARTED	DATE COMPLETED	
		39665-15-D

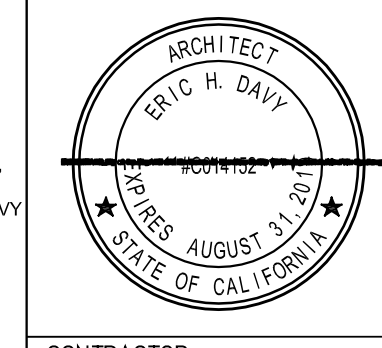
CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



DAVY ARCHITECTURE
1053 TENTH AVENUE
SAN DIEGO, CA 92101
PHONE 619.238.3811
FAX 619.238.0442
www.davyarchitecture.com

ALL IDEAS, ARRANGEMENTS AND PLANS INDICATED OR REPRESENTED BY THIS DRAWING ARE OWNED BY, AND THE PROPERTY OF ERIC DAVY ARCHITECTS, APC AND WERE CREATED, EVOLVED AND DEVELOPED FOR THE USE ON, AND IN CONNECTION WITH, THE SPECIFIED PROJECT. NONE OF SUCH IDEAS, DESIGNS, ARRANGEMENTS OR PLANS SHALL BE USED BY, OR DISCLOSED TO ANY PERSON, FIRM OR CORPORATION FOR ANY PURPOSE WHATSOEVER WITHOUT THE WRITTEN PERMISSION OF ERIC DAVY ARCHITECTS, APC. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCES OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB, AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS.



▲ LIGHTING RODS
ADDENDUM A

GENERAL NOTES

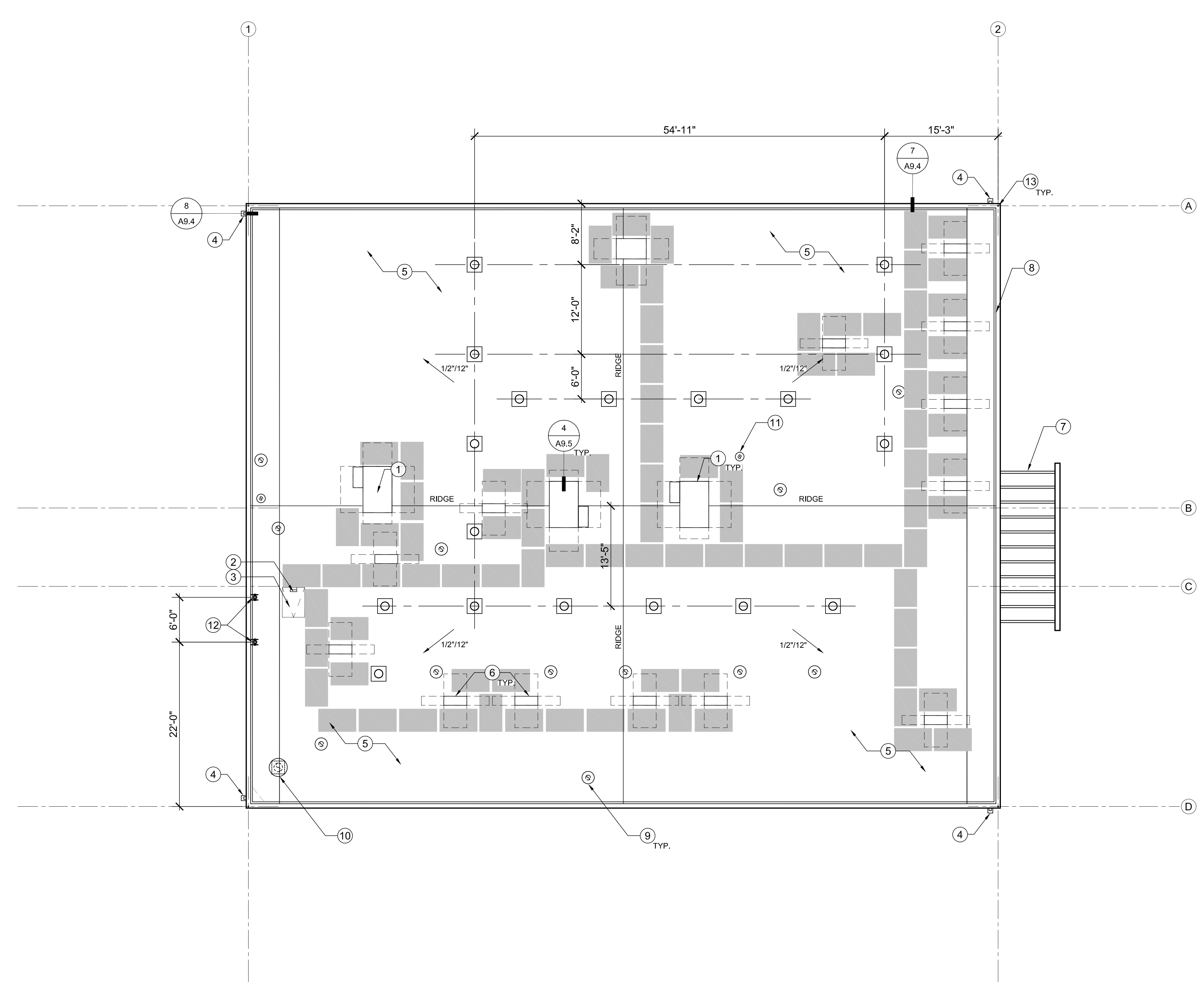
1. REFER TO ELECTRICAL & MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.

KEY NOTES

- ① (N) MECHANICAL UNIT AND CURB PER MECHANICAL DRAWINGS. 4
M4.2
- ② (N) ACCESS LADDER TO COMPLY WITH SECTION 304 CMC. PER DETAIL. 2
A9.5
- ③ (N) ROOF HATCH. PER DETAIL. 1
A9.5
- ④ (N) SCUPPER PER DETAIL. 8
A9.5
- ⑤ (N) CLASS 'A' 80 ML TPO PER SPECIFICATION. 2
A9.2
- ⑥ (N) MOUNTED CONDENSING UNIT. PER MECHANICAL DWGS. 5
M4.2
- ⑦ (E) WOOD TRELLIS TO REMAIN. SEE DETAIL. 2
A9.6
- ⑧ (N) PARAPET CAP PER DETAIL. 7
A9.5
- ⑨ OUTSIDE AIR INTAKE. PER MECHANICAL DRAWINGS. 7
M4.2
- ⑩ GRAVITY INTAKE HOOD. PER DETAIL. 7
M4.2
- ⑪ EACH VENT SHALL BE A 5' MINIMUM DISTANCE AWAY FROM MECHANICAL UNITS. 1
A9.6
- ⑫ ANTENNA AND MOUNTING CLAMP. PER DETAIL. 1
A9.6
- ⑬ LIGHTING ROD TO BE REINSTALLED. 5
A9.6

LEGEND

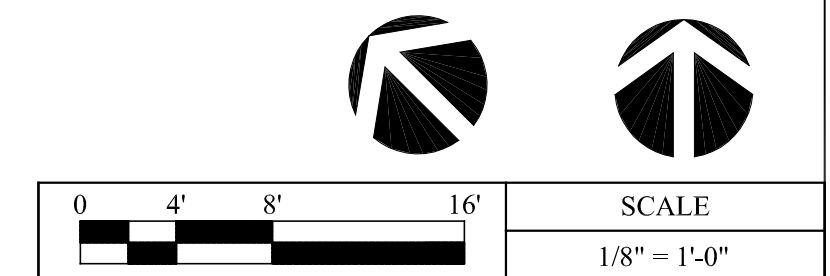
- SOLAR TUBE, SEE DETAIL 5
A9.6
- ⊙ SEE MECHANICAL FOR MORE INFORMATION.
- # KEY NOTE REFERENCE
- ⊗ DETAIL REFERENCE, SEE DETAIL SHEETS
- CENTER LINE OF SOLAR TUBES
- ▭ 36 x 60 WALKWAY, PER SPEC



ROOF PLAN

A1.9

TRUE NORTH PLAN NORTH



**PLANS FOR THE CONSTRUCTION OF
FIRE RESCUE AIR OPS FACILITY
ROOF PLAN**

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 16 OF 111 SHEETS		WBS S-15012
APPROVED: <i>Elif Cetin</i> FOR CITY ENGINEER PRINT DCE NAME	DATE 5/9/2018 C60990	SUBMITTED BY: JIHAD SLEIMAN PROJECT MANAGER
DESCRIPTION	BY	APPROVED
75% CD	MV/RA	
90% CD	MV/RA	
100% CD	MV/RA	09/22/17
ADDENDUM A	RA	05/09/18
CONTRACTOR	DATE STARTED	DATE COMPLETED
INSPECTOR		
		238-1728 CCS27 COORDINATE
		236-1728 CCS27 COORDINATE
		39665-16-D

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1

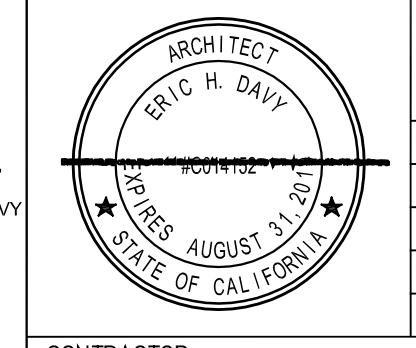
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



DAVY ARCHITECTURE

1053 TENTH AVENUE
SAN DIEGO, CA 92101
PHONE 619.238.3811
FAX 619.238.0442
www.davyarchitecture.com

ALL IDEAS, ARRANGEMENTS AND PLANS INDICATED OR REPRESENTED BY THIS DRAWING ARE OWNED BY AND THE PROPERTY OF ERIC DAVY ARCHITECTS, APC AND WERE CREATED, EVOLVED AND DEVELOPED FOR THE USE ON, AND IN CONNECTION WITH, THE SPECIFIED PROJECT. NONE OF SUCH IDEAS, DESIGNS, ARRANGEMENTS OR PLANS SHALL BE USED BY, OR DISCLOSED TO ANY PERSON, FIRM OR CORPORATION FOR ANY PURPOSE WHATSOEVER WITHOUT THE WRITTEN PERMISSION OF ERIC DAVY ARCHITECTS, APC. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCES OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB, AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS.



▲ ROOF WALKWAYS & LIGHTING RODS **ADDENDUM A**

FIRE RESCUE AIR OPERATIONS FACILITY

ABBREVIATIONS	ABBREVIATIONS CONTINUED	SHEET INDEX		SHEET INDEX		PROJECT TEAM																																																																																																																																																																																																																																																																																																																																																	
A.B. ANCHOR BOLT A.C. AIR CONDITIONING A.C. ASPHALT CONCRETE A.D. AREA DRAIN ADAAG AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES ACCOUS. ACOUSTICAL A.F.F. ABOVE FINISH FLOOR ALUM. ALUMINUM APPROX. APPROXIMATE ARCH. ARCHITECTURAL BO. BOARD BLDG. BUILDING B.L.K. BLOCK B.L.O. BLOODING B.M. BEAM B.N. BOUNDARY NAILING B.O.T. BOTTOM B.E.T. BETWEEN C.A.T.V. CABLE TELEVISION C.B. CATCH BASIN C.E.M. CEMENT C.I. CAST IRON C.J. CEILING JOIST C.J. CONTROL JOINT C.L.C. CEILING C.M.U. CONCRETE MASONRY UNIT C.O. CLEAN OUT C.O.L. COLUMN C.O.N.C. CONCRETE C.O.N.T. CONTINUOUS C.Y. CURB YARD C.E.R.A.M. CERAMIC TILE D.B.L. DOUBLE D.E.T. DETAIL D.F. DOUGLAS FIR D.F. DRINKING FOUNTAIN D.M. DIAMETER D.M.L. DIMENSION D.N. DOWN D.R. DOOR D.S. DOWNDRAFT D.W.G. DRAWING E.J. EXPANSION JOINT E.L.C. ELECTRICAL E.L.V. ELEVATION E.P. ELECTRICAL PANEL F.O. FLOOR E.Q.T. EQUIPMENT E.H. EACH WAY E.X.I.S.T. EXISTING E.X.T. EXTERIOR F.D.N. FOUNDATION F.F. FIRE EXTINGUISHER CABINET F.F. FINISH FLOOR F.N.T. FINISH F.X.T. FIXTURE F.L.O.R. FLOOR F.L.U.O.R. FLUORESCENT F.H. FIRE HYDRANT F.O.M. FACE OF MASONRY F.S. FACE OF STUD F.S. FLOOR SINK F.T.G. FOOTING F.U.R.E. FURRING F.U.T. FUTURE G.A. GAUGE G.A.L.V. GALVANIZED G.E.N.E.R.A.L. GENERAL CONTRACTOR G.I. GALVANIZED IRON G.L.B. GLUE-LAM BEAM G.L. GLASS G.R. GRADE G.Y.P.S.U.M. GYPSUM WALL BOARD H.B. HOSIERY BOARD H.D.R. HEADER H.W. HARDWARE H.T. HEIGHT H.M. HOLLOW METAL H.O.R. HORIZONTAL H.P. HIGH POINT H.T.G. HEATING H.W.D. HEATING, VENTILATION & AIR H.W.C. HEATING, VENTILATION & AIR I.D. INSIDE DIAMETER I.E. INVERT ELEVATION I.N.S.U.L. INSULATION I.N.T. INTERIOR JOINT I.N.T. JOINT J.S.T. JOIST L.A.M. LAMINATED L.A.V. LAVATORY M.B. MACHINE BOLT M.E.C.H. MECHANICAL M.T.L. METAL M.F.R. MANUFACTURER M.H. MAN HOLE N.I.C. NOT IN CONTRACT N.O. NUMBER N.O.M. NOMINAL N.T.S. NOT TO SCALE O.A. OVERALL O.C. ON CENTER O.D. OUTSIDE DIAMETER O.F.D. OVERFLOW DRAIN O.P.N.G. OPENING P.A.R.T.N. PARTITION P.C.P. PORTLAND CEMENT PLASTER P.L. PROPERTY LINE P.L.A.S. PLASTIC P.L.V.O.D. PLYWOOD P.O.C. POINT OF CONNECTION P.T. PRESSURE TREATED Q.T. QUARRY TILE R.D. RADIUS R.O.O.F. ROOF DRAIN R.E.F. REFERENCE R.E.N.F. REINFORCEMENT R.E.Q.D. REQUIRED R.O. ROUGH OPENING R.O.W. RIGHT OF WAY S.A.T. SUSPENDED ACOUSTICAL TILE S.C. SOLID CORE S.E.C.T. SECTION S.H.T. SHEATHING S.H.T.G. SHEATHING S.M. SIMILAR S.P.E.C. SPECIFICATION S.Q. SQUARE S. SERVICE S.K. SINK S.S. STAINLESS STEEL S.T.D. STANDARD S.T.L. STEEL S.T.O.R. STORAGE S.T.R.U.C.T. STRUCTURAL S.O.V. SHUT OFF VALVE S.Y.M. SYMMETRICAL T.B. TOP OF BEAM T.O. TOP OF CURB T.E.L. TELEPHONE T.G. TONGUE AND GROOVE T.H.K. THICK T.K.B.D. TACKBOARD T.O.P. TOP OF PARAPET T.S. TOP OF SHEATHING T.O.W. TOP OF WALL U.B.C. UNIFORM BUILDING CODE U.O.N. UNLESS OTHERWISE NOTED	VERT. VERTICAL V.T.R. VENT THRU ROOF W.C. WATER CLOSET W.H. WATER HEATER W.R. WATER RESISTANT W.O. WHERE OCCURS W.W.F. WELDED WIRE FABRIC DISCIPLINE CODE G GENERAL D DEMOLITION C CIVIL A ARCHITECTURAL S STRUCTURAL M MECHANICAL P PLUMBING E ELECTRICAL F FIRE APPLICABLE CODES 1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH: 1.1. 2016 CALIFORNIA BUILDING CODE 1.2. CALIFORNIA CODE REGULATIONS: TITLE 8, INDUSTRIAL CODES TITLE 19, PUBLIC SAFETY TITLE 21, PUBLIC WORKS TITLE 24, BUILDING STANDARDS 1.3. AMERICANS WITH DISABILITIES ACT 2. ALL BARRIER-FREE ITEMS SHALL COMPLY W/ TITLE 21 AND 24 OF THE CALIFORNIA CODE OF REGULATIONS, 2016. 3. ALL WORK AND MATERIALS SHALL BE IN FULL ACCORDANCE WITH THE REQUIREMENTS OF THESE CODES AND ALL APPLICABLE LOCAL ORDINANCES. WHERE CONTRACT DOCUMENTS EXCEED W/OUT VIOLATING CODE AND REGULATIONS REQUIREMENTS, CONTRACT DOCUMENTS TAKE PRECEDENCE. WHERE CODES CONFLICT, THE MORE STRINGENT SHALL APPLY. 4. PROTECTION DURING WELDING: CONFORM TO TITLE 8, C.C.R., FURTHER PROTECT OCCUPANTS AND THE GENERAL PUBLIC WITH PORTABLE SOLID VISION BARRICADES AROUND LOCATION WHERE WELDING IS BEING PERFORMED. PROVIDE SIGNS WARNING AGAINST LOOKING AT WELDING W/OUT PROPER EYE PROTECTION OR EQUIVALENT. 5. DURING THE ENTIRE CONSTRUCTION PERIOD, IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN CONDITIONS AT THE PROJECT SITE TO MEET THE REQUIREMENTS OF CALIFORNIA OCCUPATIONAL REGULATIONS. 6. ALL ACCESS ROADS AND FIRE HYDRANTS SHALL BE INSTALLED AND FULLY USABLE PRIOR TO LOADING THE SITE WITH CONSTRUCTION MATERIALS. 7. OTHER APPLICABLE CODES AND STANDARDS: 2016 BUILDING STANDARDS ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R. 2016 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R. (2015 INTERNATIONAL BUILDING CODE VOLUMES 1-2 AND CALIFORNIA AMENDMENTS) 2016 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R. (2014 NATIONAL ELECTRICAL CODE AND 2016 CALIFORNIA AMENDMENTS) 2016 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24 C.C.R. (2012 UNIFORM MECHANICAL CODE AND 2013 CALIFORNIA AMENDMENTS) 2016 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R. (2012 UNIFORM PLUMBING CODE AND 2013 CALIFORNIA AMENDMENTS) 2016 CALIFORNIA ENERGY CODE, PART 6, TITLE 24 C.C.R. 2016 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24 C.C.R. (2015 INTERNATIONAL FIRE CODE AND CALIFORNIA AMENDMENTS) 2016 GREEN CALIFORNIA BUILDING STANDARDS, CALGREEN CODE, TITLE 24 C.C.R. 2016 CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24 C.C.R. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS 2007 SAFETY CODE FOR ELEVATORS AND ESCALATORS (ASTM A17.1/CSA B44-2007) WITH A17.1A/CSA B44-08 ADDENDA NFPA 13 AUTOMATIC SPRINKLER SYSTEMS, 2013 EDITION NFPA 14 STANDPIPE SYSTEMS (CA AMENDED), 2013 EDITION NFPA 17 DRY CHEMICAL EXTINGUISHING SYSTEMS, 2013 EDITION NFPA 17A WET CHEMICAL SYSTEMS, 2013 EDITION NFPA 20 STATIONARY PUMPS, 2013 EDITION NFPA 22 WATER TANKS, 2013 EDITION NFPA 24 PRIVATE FIRE MAINS (CA AMENDED), 2013 EDITION NFPA 72 NATIONAL FIRE ALARM CODE (CAL. AMENDED), 2013 EDITION (NOTE SEE UL STANDARD 1971 FOR "VISUAL DEVICES") NFPA 80 FIRE DOOR AND OTHER OPENING PROTECTIVES, 2013 EDITION NFPA 253 CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS, 2006 EDITION NFPA 2001 CLEAN AGENT FIRE EXTINGUISHING SYSTEMS, 2012 EDITION REFERENCE CODE SECTION FOR NFPA STANDARDS - 2016 CBC (SFM) CH. 35	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SHEET NO.</th> <th>DISCIPLINE CODE</th> <th>TITLE</th> </tr> </thead> <tbody> <tr><td>1.</td><td>G1.0</td><td>COVER SHEET</td></tr> <tr><td>2.</td><td>G1.1</td><td>GENERAL NOTES</td></tr> <tr><td>3.</td><td>G1.2</td><td>MOUNTING HEIGHTS & ACCESSIBILITY</td></tr> <tr><td>4.</td><td>G1.3</td><td>STORM WATER NOTES</td></tr> <tr><td>5.</td><td>C-1</td><td>CIVIL - SITE PLUMBING PLAN</td></tr> <tr><td>6.</td><td>C-2</td><td>BMP PLAN</td></tr> <tr><td>7.</td><td>A1.0</td><td>PLOT PLAN</td></tr> <tr><td>8.</td><td>A1.1</td><td>SITE DEMOLITION PLAN</td></tr> <tr><td>9.</td><td>A1.2</td><td>SITE PLAN</td></tr> <tr><td>10.</td><td>A1.3</td><td>EGRESS PLAN</td></tr> <tr><td>11.</td><td>A1.4</td><td>DEMOLITION FLOOR PLAN</td></tr> <tr><td>12.</td><td>A1.5</td><td>FLOOR PLAN</td></tr> <tr><td>13.</td><td>A1.6</td><td>DEMOLITION REFLECTED CEILING PLAN</td></tr> <tr><td>14.</td><td>A1.7</td><td>REFLECTED CEILING PLAN</td></tr> <tr><td>15.</td><td>A1.8</td><td>DEMOLITION ROOF PLAN</td></tr> <tr><td>16.</td><td>A1.9</td><td>ROOF PLAN</td></tr> <tr><td>17.</td><td>A2.0</td><td>DEMOLITION EXTERIOR ELEVATIONS</td></tr> <tr><td>18.</td><td>A2.1</td><td>EXTERIOR ELEVATIONS</td></tr> <tr><td>19.</td><td>A2.2</td><td>INTERIOR ELEVATIONS</td></tr> <tr><td>20.</td><td>A2.3</td><td>INTERIOR ELEVATIONS</td></tr> <tr><td>21.</td><td>A2.4</td><td>INTERIOR ELEVATIONS</td></tr> <tr><td>22.</td><td>A2.5</td><td>INTERIOR ELEVATIONS</td></tr> <tr><td>23.</td><td>A2.6</td><td>INTERIOR ELEVATIONS</td></tr> <tr><td>24.</td><td>A4.0</td><td>ENLARGED FLOOR PLANS</td></tr> <tr><td>25.</td><td>A4.1</td><td>ENLARGED FLOOR PLANS</td></tr> <tr><td>26.</td><td>A4.2</td><td>ENLARGED FLOOR PLANS</td></tr> <tr><td>27.</td><td>A5.0</td><td>BUILDING SECTION</td></tr> <tr><td>28.</td><td>A6.0</td><td>DOOR SCHEDULE</td></tr> <tr><td>29.</td><td>A6.1</td><td>WINDOW SCHEDULE</td></tr> <tr><td>30.</td><td>A9.0</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>31.</td><td>A9.1</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>32.</td><td>A9.2</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>33.</td><td>A9.3</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>34.</td><td>A9.4</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>35.</td><td>A9.5</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>36.</td><td>A9.6</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>37.</td><td>A9.7</td><td>ARCHITECTURAL DETAILS</td></tr> <tr><td>38.</td><td>I1.0</td><td>INTERIOR FINISH PLAN</td></tr> <tr><td>39.</td><td>I1.1</td><td>INTERIOR FLOOR FINISH DIAGRAM</td></tr> <tr><td>40.</td><td>S-001</td><td>GENERAL NOTES</td></tr> <tr><td>41.</td><td>S-002</td><td>GENERAL NOTES & ABBREVIATIONS</td></tr> <tr><td>42.</td><td>S-111</td><td>FOUNDATION PLAN</td></tr> <tr><td>43.</td><td>S-131</td><td>ROOF FRAMING PLAN</td></tr> <tr><td>44.</td><td>S-501</td><td>TYPICAL DETAILS</td></tr> <tr><td>45.</td><td>S-502</td><td>TYPICAL DETAILS</td></tr> <tr><td>46.</td><td>S-701</td><td>FOUNDATION DETAILS</td></tr> <tr><td>47.</td><td>S-801</td><td>FRAMING DETAILS</td></tr> <tr><td>48.</td><td>S-802</td><td>FRAMING DETAILS</td></tr> <tr><td>49.</td><td>S-803</td><td>FRAMING DETAILS</td></tr> <tr><td>50.</td><td>M0.1</td><td>MECHANICAL LEGENDS & NOTES</td></tr> <tr><td>51.</td><td>M0.2</td><td>MECHANICAL EQUIPMENT SCHEDULES</td></tr> <tr><td>52.</td><td>M0.3</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>53.</td><td>M0.4</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>54.</td><td>M0.5</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>55.</td><td>M0.6</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>56.</td><td>M0.7</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>57.</td><td>M0.8</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>58.</td><td>M0.9</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>59.</td><td>M0.10</td><td>TITLE 24 COMPLIANCE</td></tr> <tr><td>60.</td><td>M1.1</td><td>MECHANICAL DEMOLITION FLOOR PLAN</td></tr> <tr><td>61.</td><td>M1.2</td><td>MECHANICAL DEMOLITION ROOF PLAN</td></tr> <tr><td>62.</td><td>M2.1</td><td>MECHANICAL ZONING PLAN</td></tr> <tr><td>63.</td><td>M3.1</td><td>MECHANICAL FLOOR PLAN</td></tr> <tr><td>64.</td><td>M3.2</td><td>MECHANICAL ROOF PLAN</td></tr> <tr><td>65.</td><td>M4.1</td><td>MECHANICAL DETAILS</td></tr> <tr><td>66.</td><td>M4.2</td><td>MECHANICAL DETAILS</td></tr> <tr><td>67.</td><td>P0.1</td><td>PLUMBING LEGENDS & NOTES</td></tr> <tr><td>68.</td><td>P0.2</td><td>PLUMBING SCHEDULES</td></tr> <tr><td>69.</td><td>P2.1</td><td>PLUMBING DEMOLITION FLOOR PLAN</td></tr> <tr><td>70.</td><td>P3.1</td><td>PLUMBING FLOOR PLAN - WASTE AND VENT</td></tr> <tr><td>71.</td><td>P3.2</td><td>PLUMBING FLOOR PLAN - DOMESTIC WATER</td></tr> <tr><td>72.</td><td>P4.1</td><td>PLUMBING FLOOR PLAN - ENLARGED WASTE AND VENT</td></tr> <tr><td>73.</td><td>M0.4</td><td>PLUMBING FLOOR PLAN - ENLARGED DOMESTIC WATER</td></tr> <tr><td>74.</td><td>P6.1</td><td>PLUMBING ROOF PLAN</td></tr> <tr><td>75.</td><td>P6.1</td><td>PLUMBING DETAILS</td></tr> <tr><td>76.</td><td>P6.2</td><td>PLUMBING DETAILS</td></tr> <tr><td>77.</td><td>P6.3</td><td>PLUMBING DIAGRAMS</td></tr> <tr><td>78.</td><td>P6.4</td><td>PLUMBING DETAILS AND DIAGRAMS</td></tr> <tr><td>79.</td><td>E0.0</td><td>CITY OF SAN DIEGO CONSTRUCTION STANDARDS</td></tr> <tr><td>80.</td><td>E1.0</td><td>ELECTRICAL SITE AND BUILDING PLAN - DEMO</td></tr> <tr><td>81.</td><td>E1.1</td><td>ELECTRICAL SITE PLAN - NEW</td></tr> <tr><td>82.</td><td>E2.0</td><td>ELECTRICAL LIGHTING PLAN - DEMO</td></tr> <tr><td>83.</td><td>E2.1</td><td>ELECTRICAL LIGHTING PLAN - NEW</td></tr> <tr><td>84.</td><td>E3.0</td><td>ELECTRICAL POWER PLAN - DEMO</td></tr> <tr><td>85.</td><td>E3.1</td><td>ELECTRICAL POWER PLAN - NEW</td></tr> <tr><td>86.</td><td>E3.1V</td><td>ELECTRICAL LOW VOLTAGE PLAN - NEW</td></tr> <tr><td>87.</td><td>E3.2</td><td>ELECTRICAL STATION ALERTING PLAN</td></tr> <tr><td>88.</td><td>E4.0</td><td>ELECTRICAL HVAC PLAN</td></tr> <tr><td>89.</td><td>E4.1</td><td>ELECTRICAL ROOF PLAN</td></tr> <tr><td>90.</td><td>E5.0</td><td>ELECTRICAL PANEL & SINGLE LINE DIAGRAM</td></tr> <tr><td>91.</td><td>E5.1</td><td>ELECTRICAL CALCS</td></tr> <tr><td>92.</td><td>E5.2</td><td>GENERATOR CUT SHEETS</td></tr> <tr><td>93.</td><td>E6.0</td><td>GENERATOR CUT SHEETS</td></tr> <tr><td>94.</td><td>E6.0</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> <tr><td>95.</td><td>E6.1</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> </tbody> </table>	SHEET NO.	DISCIPLINE CODE	TITLE	1.	G1.0	COVER SHEET	2.	G1.1	GENERAL NOTES	3.	G1.2	MOUNTING HEIGHTS & ACCESSIBILITY	4.	G1.3	STORM WATER NOTES	5.	C-1	CIVIL - SITE PLUMBING PLAN	6.	C-2	BMP PLAN	7.	A1.0	PLOT PLAN	8.	A1.1	SITE DEMOLITION PLAN	9.	A1.2	SITE PLAN	10.	A1.3	EGRESS PLAN	11.	A1.4	DEMOLITION FLOOR PLAN	12.	A1.5	FLOOR PLAN	13.	A1.6	DEMOLITION REFLECTED CEILING PLAN	14.	A1.7	REFLECTED CEILING PLAN	15.	A1.8	DEMOLITION ROOF PLAN	16.	A1.9	ROOF PLAN	17.	A2.0	DEMOLITION EXTERIOR ELEVATIONS	18.	A2.1	EXTERIOR ELEVATIONS	19.	A2.2	INTERIOR ELEVATIONS	20.	A2.3	INTERIOR ELEVATIONS	21.	A2.4	INTERIOR ELEVATIONS	22.	A2.5	INTERIOR ELEVATIONS	23.	A2.6	INTERIOR ELEVATIONS	24.	A4.0	ENLARGED FLOOR PLANS	25.	A4.1	ENLARGED FLOOR PLANS	26.	A4.2	ENLARGED FLOOR PLANS	27.	A5.0	BUILDING SECTION	28.	A6.0	DOOR SCHEDULE	29.	A6.1	WINDOW SCHEDULE	30.	A9.0	ARCHITECTURAL DETAILS	31.	A9.1	ARCHITECTURAL DETAILS	32.	A9.2	ARCHITECTURAL DETAILS	33.	A9.3	ARCHITECTURAL DETAILS	34.	A9.4	ARCHITECTURAL DETAILS	35.	A9.5	ARCHITECTURAL DETAILS	36.	A9.6	ARCHITECTURAL DETAILS	37.	A9.7	ARCHITECTURAL DETAILS	38.	I1.0	INTERIOR FINISH PLAN	39.	I1.1	INTERIOR FLOOR FINISH DIAGRAM	40.	S-001	GENERAL NOTES	41.	S-002	GENERAL NOTES & ABBREVIATIONS	42.	S-111	FOUNDATION PLAN	43.	S-131	ROOF FRAMING PLAN	44.	S-501	TYPICAL DETAILS	45.	S-502	TYPICAL DETAILS	46.	S-701	FOUNDATION DETAILS	47.	S-801	FRAMING DETAILS	48.	S-802	FRAMING DETAILS	49.	S-803	FRAMING DETAILS	50.	M0.1	MECHANICAL LEGENDS & NOTES	51.	M0.2	MECHANICAL EQUIPMENT SCHEDULES	52.	M0.3	TITLE 24 COMPLIANCE	53.	M0.4	TITLE 24 COMPLIANCE	54.	M0.5	TITLE 24 COMPLIANCE	55.	M0.6	TITLE 24 COMPLIANCE	56.	M0.7	TITLE 24 COMPLIANCE	57.	M0.8	TITLE 24 COMPLIANCE	58.	M0.9	TITLE 24 COMPLIANCE	59.	M0.10	TITLE 24 COMPLIANCE	60.	M1.1	MECHANICAL DEMOLITION FLOOR PLAN	61.	M1.2	MECHANICAL DEMOLITION ROOF PLAN	62.	M2.1	MECHANICAL ZONING PLAN	63.	M3.1	MECHANICAL FLOOR PLAN	64.	M3.2	MECHANICAL ROOF PLAN	65.	M4.1	MECHANICAL DETAILS	66.	M4.2	MECHANICAL DETAILS	67.	P0.1	PLUMBING LEGENDS & NOTES	68.	P0.2	PLUMBING SCHEDULES	69.	P2.1	PLUMBING DEMOLITION FLOOR PLAN	70.	P3.1	PLUMBING FLOOR PLAN - WASTE AND VENT	71.	P3.2	PLUMBING FLOOR PLAN - DOMESTIC WATER	72.	P4.1	PLUMBING FLOOR PLAN - ENLARGED WASTE AND VENT	73.	M0.4	PLUMBING FLOOR PLAN - ENLARGED DOMESTIC WATER	74.	P6.1	PLUMBING ROOF PLAN	75.	P6.1	PLUMBING DETAILS	76.	P6.2	PLUMBING DETAILS	77.	P6.3	PLUMBING DIAGRAMS	78.	P6.4	PLUMBING DETAILS AND DIAGRAMS	79.	E0.0	CITY OF SAN DIEGO CONSTRUCTION STANDARDS	80.	E1.0	ELECTRICAL SITE AND BUILDING PLAN - DEMO	81.	E1.1	ELECTRICAL SITE PLAN - NEW	82.	E2.0	ELECTRICAL LIGHTING PLAN - DEMO	83.	E2.1	ELECTRICAL LIGHTING PLAN - NEW	84.	E3.0	ELECTRICAL POWER PLAN - DEMO	85.	E3.1	ELECTRICAL POWER PLAN - NEW	86.	E3.1V	ELECTRICAL LOW VOLTAGE PLAN - NEW	87.	E3.2	ELECTRICAL STATION ALERTING PLAN	88.	E4.0	ELECTRICAL HVAC PLAN	89.	E4.1	ELECTRICAL ROOF PLAN	90.	E5.0	ELECTRICAL PANEL & SINGLE LINE DIAGRAM	91.	E5.1	ELECTRICAL CALCS	92.	E5.2	GENERATOR CUT SHEETS	93.	E6.0	GENERATOR CUT SHEETS	94.	E6.0	ELECTRICAL T-24 SCHEDULES	95.	E6.1	ELECTRICAL T-24 SCHEDULES	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SHEET NO.</th> <th>DISCIPLINE CODE</th> <th>TITLE</th> </tr> </thead> <tbody> <tr><td>96.</td><td>E6.2</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> <tr><td>97.</td><td>E6.3</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> <tr><td>98.</td><td>FA.0.1</td><td>FIRE ALARM GENERAL NOTES & LEGEND</td></tr> <tr><td>99.</td><td>FA.1.01</td><td>FIRE ALARM FLOOR PLAN - LEVEL 1</td></tr> <tr><td>100.</td><td>FA.5.01</td><td>FIRE ALARM DETAILS</td></tr> <tr><td>101.</td><td>FA.5.02</td><td>FIRE ALARM DETAILS</td></tr> <tr><td>102.</td><td>FA.5.03</td><td>FIRE RISER DIAGRAM</td></tr> <tr><td>103.</td><td>FS.0.1</td><td>FIRE SUPPRESSION GENERAL NOTES & LEGEND</td></tr> <tr><td>104.</td><td>FS.1.00</td><td>SITE PLAN</td></tr> <tr><td>105.</td><td>FS.1.01</td><td>FIRE SUPPRESSION FLOOR PLAN LEVEL 1</td></tr> <tr><td>106.</td><td>FS.2.01</td><td>FIRE SUPPRESSION RCP - LEVEL 1</td></tr> <tr><td>107.</td><td>FS.3.01</td><td>FIRE SUPPRESSION SECTION VIEW</td></tr> <tr><td>108.</td><td>FS.4.01</td><td>FIRE SUPPRESSION HYDRAULIC CALCULATION ABOVE CEILING</td></tr> <tr><td>109.</td><td>FS.4.02</td><td>FIRE SUPPRESSION HYDRAULIC CALCULATION BELOW CEILING</td></tr> <tr><td>110.</td><td>FS.5.01</td><td>FIRE SUPPRESSION DETAILS</td></tr> <tr><td>111.</td><td>FS.5.02</td><td>FIRE SUPPRESSION DETAILS</td></tr> </tbody> </table>	SHEET NO.	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FS.5.02	FIRE SUPPRESSION DETAILS	ARCHITECT: ERIC DAVY DAVY ARCHITECTURE 1053 TENTH AVENUE SAN DIEGO, CA 92101 619-238-3811 CONTACT: MIKE VANDERHOOF EMAIL: MVANDERHOOF@DAVYARCHITECTURE.COM CIVIL: OMEGA ENGINEERING CONSULTING 4340 VIEWRIDGE AVENUE, SUITE B SAN DIEGO, CA 92123 585-634-8620 CONTACT: SEAN SAVAGE EMAIL: SEAN@OMEGA-CONSULTANTS.COM STRUCTURAL: GSSI STRUCTURAL ENGINEERS 3969 FIRST AVENUE, SUITE 200 SAN DIEGO, CA 92103 619-687-3810 CONTACT: OMAR GONZALES EMAIL: SEAN@OMEGA-CONSULTANTS.COM MECHANICAL & PLUMBING: WALSH ENGINEERINGS 4711 VIEWRIDGE AVENUE, SUITE 210 SAN DIEGO, CA 92123 858-541-0788 CONTACT: MARK HYDE EMAIL: MHYDE@WALSHENG.COM ELECTRICAL: NEDC, INC 3103 FALCON STREET, SUITE J SAN DIEGO, CA 92103 619-278-0076 CONTACT: DAVID NUTTER EMAIL: DAVID@NEDINC.NET FIRE PROTECTION: TK1SC 4755 EASTGATE MALL SUITE 150 SAN DIEGO, CA 92121 858-362-6800 CONTACT: DEREK DUVAL EMAIL: DDUVAL@TK1SC.COM
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83.	E2.1	ELECTRICAL LIGHTING PLAN - NEW																																																																																																																																																																																																																																																																																																																																																					
84.	E3.0	ELECTRICAL POWER PLAN - DEMO																																																																																																																																																																																																																																																																																																																																																					
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86.	E3.1V	ELECTRICAL LOW VOLTAGE PLAN - NEW																																																																																																																																																																																																																																																																																																																																																					
87.	E3.2	ELECTRICAL STATION ALERTING PLAN																																																																																																																																																																																																																																																																																																																																																					
88.	E4.0	ELECTRICAL HVAC PLAN																																																																																																																																																																																																																																																																																																																																																					
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90.	E5.0	ELECTRICAL PANEL & SINGLE LINE DIAGRAM																																																																																																																																																																																																																																																																																																																																																					
91.	E5.1	ELECTRICAL CALCS																																																																																																																																																																																																																																																																																																																																																					
92.	E5.2	GENERATOR CUT SHEETS																																																																																																																																																																																																																																																																																																																																																					
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94.	E6.0	ELECTRICAL T-24 SCHEDULES																																																																																																																																																																																																																																																																																																																																																					
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103.	FS.0.1	FIRE SUPPRESSION GENERAL NOTES & LEGEND																																																																																																																																																																																																																																																																																																																																																					
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106.	FS.2.01	FIRE SUPPRESSION RCP - LEVEL 1																																																																																																																																																																																																																																																																																																																																																					
107.	FS.3.01	FIRE SUPPRESSION SECTION VIEW																																																																																																																																																																																																																																																																																																																																																					
108.	FS.4.01	FIRE SUPPRESSION HYDRAULIC CALCULATION ABOVE CEILING																																																																																																																																																																																																																																																																																																																																																					
109.	FS.4.02	FIRE SUPPRESSION HYDRAULIC CALCULATION BELOW CEILING																																																																																																																																																																																																																																																																																																																																																					
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SCOPE OF WORK				REMODEL OF AN EXISTING 8,136 SQ.FT. TYPE V-B, COMMERCIAL BUILDING. WORK INCLUDES DEMOLITION OF EXISTING LIGHT FIXTURES, CEILING, INTERIOR WALLS AND PLUMBING FIXTURES. IMPROVEMENT WILL ALSO INCLUDE STRUCTURAL RETROFIT TO THE EXISTING STRUCTURE FOR SEISMIC UPGRADE AND TO ACCOMMODATE NEW EXTERIOR WINDOW OPENINGS NEW CEILINGS, NEW ELECTRICAL, MECHANICAL & PLUMBING.																																																																																																																																																																																																																																																																																																																																																			
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LEGAL DESCRIPTION		OWNER		MONTGOMERY FIELD *SUBLEASE (UNIT 10-A) IN LOT 9 4302 PONDEROSA AVE, SAN DIEGO, CA 92123 CITY OF SAN DIEGO 525 B STREET SUITE 750 SAN DIEGO CA, 92101 PHONE NUMBER 619-533-7532 PROJECT MANAGER JIHAD SLEIMAN																																																																																																																																																																																																																																																																																																																																																			
SITE ADDRESS		ASSESSOR'S NUMBER																																																																																																																																																																																																																																																																																																																																																					
4302 PONDEROSA AVE, SAN DIEGO, CA 92123		76-02-22-3224		PROJECT DATA ZONE: UNZONED SITE ACREAGE: 1.2 TYPE OF CONSTRUCTION: TYPE V-B FULLY SPRINKLERED YEAR OF CONSTRUCTION: 1986 NUMBER OF STORIES: 1 STORY OCCUPANCY: B & R-2 (MIXED USE) BUSINESS: 5,840 RESIDENTIAL: 2,296 BUILDING SQUARE FOOTAGE: 8,136 SQ.FT.																																																																																																																																																																																																																																																																																																																																																			
CONTRACTOR'S RESPONSIBILITY																																																																																																																																																																																																																																																																																																																																																							
1. PURSUANT TO SECTION 4216 OF THE CALIFORNIA GOVERNMENT CODE, AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION, YOU MUST CONTACT THE REGIONAL NOTIFICATION CENTER (E.G. UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA) AND OBTAIN AN INQUIRY IDENTIFICATION NUMBER.		2. NOTIFY SDG&E AT LEAST 10 WORKING DAYS PRIOR TO EXCAVATING WITHIN 10' OF SDG&E UNDERGROUND HIGH VOLTAGE TRANSMISSION POWER LINES. (I.E., 69 KV & HIGHER)		DECLARATION OF RESPONSIBLE CHARGE I AM THE DESIGNER IN RESPONSIBLE CHARGE OF THIS TENANT IMPROVEMENT PROJECT. I HAVE INSPECTED THE SITE / PREMISES AND DETERMINED THAT EXISTING CONDITIONS ARE IN FULL COMPLIANCE WITH CURRENT SITE ACCESSIBILITY REQUIREMENTS TO THE EXTENT REQUIRED BY LAW. PRINT NAME: ERIC DAVY SIGNATURE: _____ DATE: 09 / 22 / 2017																																																																																																																																																																																																																																																																																																																																																			
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DAVY ARCHITECTURE 1053 TENTH AVENUE SAN DIEGO, CA 92101 PHONE 619.238.3811 FAX 619.238.0442 www.davyarchitecture.com		SPEC. NO. 1732 SCALE: NONE		CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 29 OF 111 SHEETS WBS S-15012		SUBMITTED BY: JIHAD SLEIMAN PROJECT MANAGER CHECKED BY: JAMES BOTICA PROJECT ENGINEER																																																																																																																																																																																																																																																																																																																																																	
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FIRE RESCUE AIR OPERATIONS FACILITY

SHEET NOTES

- ① PROVIDE LINED SUPPLY AND RETURN AIR DUCTWORK FROM RTU FLEXIBLE CONNECTIONS FOR THE FIRST 10 FEET OF DUCT RUN.
- ② ROUTE DUCTWORK BETWEEN EXISTING WEB JOIST AS HIGH AS POSSIBLE.
- ③ FOR FAN COIL UNIT MOUNTING DETAIL SEE 3/M4.2.
- ④ CEILING MOUNTED EXHAUST FAN.
- ⑤ FOR HIGH WALL MOUNTED FAN COIL UNIT SEE 2/M4.2.
- ⑥ INSTALL THERMOSTAT AT 48". COORDINATE LOCATION WITH ARCHITECT OR OWNERS REPRESENTATIVE PRIOR TO INSTALLATION.
- ⑦ EQUIPMENT REQUIRED CLEARANCE. REFER TO MFR O&I MANUAL.
- ⑧ PROVIDE DUCT MOUNTED SMOKE DETECTOR ON SUPPLY AIR DUCTWORK.
- ⑨ ROUTE 10"Ø OUTSIDE AIR DUCTWORK UP THRU ROOF TO ROOF CAP. FOR TYPICAL ROOF CAP DETAIL SEE 6/M4.2.
- ⑩ ENCASE THERMOSTAT IN PROTECTIVE COVER.
- ⑪ ROUTE 10"Ø KITCHEN HOOD EXHAUST DUCT UP THRU ROOF TO ROOF CAP. FOR TYPICAL ROOF CAP DETAIL SEE 6/M4.2.
- ⑫ ROUTE SUPPLY AND RETURN AIR DUCT UP THRU ROOF TO RTU-1.
- ⑬ ROUTE SUPPLY AND RETURN AIR DUCT UP THRU ROOF TO RTU-2.
- ⑭ ROUTE SUPPLY AND RETURN AIR DUCT UP THRU ROOF TO RTU-3.
- ⑮ ROUTE SUPPLY AND RETURN AIR DUCT UP THRU ROOF TO RTU-4.
- ⑯ ROUTE EXHAUST AIR DUCT UP THRU ROOF TO EF-1.
- ⑰ ROUTE EXHAUST AIR DUCT UP THRU ROOF TO EF-2.
- ⑱ ROUTE EXHAUST AIR DUCT UP THRU ROOF TO EF-3.
- ⑲ ROOF ACCESS LADDER SHALL COMPLY WITH SECTION 304 CMC.
- ⑳ PROVIDE A 4"Ø RIGID GALVANIZED SHEET METAL DRYER DUCT AND ROUTE UP THRU ROOF TO ROOF CAP. EXHAUST DUCT SHALL NOT BE ASSEMBLED WITH SCREWS OR OTHER FASTENING MEANS THAT EXTEND INTO THE DUCT AND THAT ARE CAPABLE OF CATCHING LINT, AND THAT REDUCE THE EFFICIENCY OF THE EXHAUST SYSTEM. SCREEN/LOUVERS SHALL NOT BE INSTALLED AT DRYER VENT TERMINATIONS PER SECTION 504.4 CMC. DUCT LENGTH IS APPROXIMATELY 12' WITH ONE 90° ELBOW. DRYER VENTS SHALL BE EQUIPPED WITH BACK-DRAFT DAMPERS PER SECTION 504.1.1 CMC.
- ㉑ PROVIDE TRANSFER AIR FOR DRYER MAKE-UP AIR. PROVIDE A BACKDRAFT DAMPER IN THE TRANSFER AIR DUCTWORK.
- ㉒ PROVIDE GRAVITY INTAKE VENT WITH FACTORY SUPPLIED BACKDRAFT DAMPER. FOR TYPICAL GRAVITY INTAKE HOOD DETAIL SEE 7/M4.2.
- ㉓ ROUTE 10"Ø OUTSIDE AIR DUCTWORK UP THRU ROOF TO ROOF CAP. FOR TYPICAL ROOF CAP DETAIL SEE 6/M4.2.

GENERAL NOTES

1. CONDITIONS SHOWN ON THE PLANS ARE BASED ON NON DESTRUCTIVE FIELD SURVEY AND AVAILABLE AS-BUILT DRAWINGS. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES TO THE ARCHITECT AND ENGINEER OF RECORD PRIOR TO COMMENCEMENT OF WORK.
2. ALL WORK SHALL BE PER LATEST SMACNA STANDARDS AND LATEST CMC REQUIREMENTS. SEE FLOOR PLAN FOR ADDITIONAL INFORMATION.
3. UPON COMPLETION OF WORK, CONTRACTOR SHALL PROVIDE A COPY OF THE TEST AND BALANCE REPORT FOR ALL NEW RTU/FC UNITS ALONG WITH A SEPARATE BALANCE REPORT FOR EACH SUPPLY, RETURN AND EXHAUST AIR REGISTERS.
4. PROVIDE REMOTE MANUAL VOLUME DAMPER IF ABOVE HARD LID CEILING.
5. EXHAUST DUCTS SHALL BE EQUIPPED WITH BACK-DRAFT DAMPER PER SECTION 504.1.1 CMC.
6. MULTIPLE INSTALLATION OF TYPE 2 CLOTHES DRYERS SHALL BE MADE IN A MANNER TO PREVENT ADVERSE OPERATION DUE TO BACK PRESSURES THAT ARE CAPABLE OF BEING CREATED IN THE EXHAUST SYSTEMS PER SECTION 504.4.3.1 (6) CMC.

M3.1

PLANS FOR THE CONSTRUCTION OF FIRE RESCUE AIR OPS FACILITY MECHANICAL FLOOR PLAN

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 63 OF 111 SHEETS		WBS S-15012
APPROVED FOR CITY ENGINEER ELIF CETIN PRINT DCE NAME	DATE 5/9/2018 C60990 RCE #	SUBMITTED BY JIHAD SLEIMAN PROJECT MANAGER CHECKED BY JAMES BOTICA PROJECT ENGINEER
DESCRIPTION	BY	APPROVED
75% CD	xx/xx	
90% CD		
100% CD	DP/AH	09/22/17
ADDENDUM A		5/09/18
CONTRACTOR		DATE STARTED
INSPECTOR		DATE COMPLETED

MECHANICAL FLOOR PLAN

SCALE: 3/16" = 1'-0"

TRUE NORTH PLAN NORTH



CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.
A	5/9/2018	MECHANICAL NOTE CLARIFICATION	

WARNING

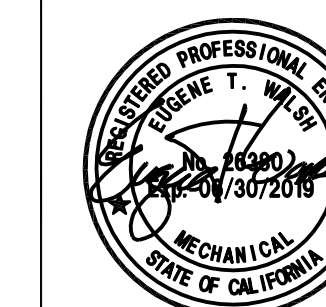
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 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

The City of
SAN DIEGO Public Works

DAVY
ARCHITECTURE
1053 TENTH AVENUE
SAN DIEGO, CA 92101
PHONE 619.238.3811
FAX 619.238.0442
www.davyarchitecture.com

WALSH
ENGINEERS
Mechanical Engineering Consultants
4711 Viewridge Ave., Suite 210
San Diego, California 92123
Ph. (858) 541-0788 Fax (858) 541-0787



FIRE RESCUE AIR OPERATIONS FACILITY

FIRE RESCUE AIR - TEMPORARY FACILITY

DSD PERMIT SET 04062018

FIRE RESCUE - TEMPORARY FACILITY

ABBREVIATIONS	ABBREVIATIONS CONTINUED	SHEET INDEX	BUILDING CODE ANALYSIS	PROJECT TEAM																																																															
A.B. ANCHOR BOLT A.C. AIR CONDITIONING A.C. ASPHALT CONCRETE A.D. AREA DRAIN ADAAG AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES ACCOUS. ACOUSTICAL A.F.F. ABOVE FINISH FLOOR ALUM. ALUMINUM APPROX. APPROXIMATE ARCH. ARCHITECTURAL BO. BOARD BLDG. BUILDING B.L.K. BLOCK B.L.O. BLOODING B.M. BEAM B.N. BOUNDARY NAILING B.T. BOTTOM BET. BETWEEN CATV. CABLE TELEVISION C.B. CATCH BASIN CEM. CEMENT C.I. CAST IRON C.J. CEILING JOIST C.L.C. CONTROL JOINT C.L.C. CEILING C.M.U. CONCRETE MASONRY UNIT C.O. CLEAN OUT COL. COLUMN CONC. CONCRETE CONT. CONTINUOUS C.Y. CURB YARD C.T. CERAMIC TILE D.B.L. DOUBLE DET. DETAIL D.F. DOUGLAS FIR D.F. DRINKING FOUNTAIN DIA. DIAMETER DIM. DIMENSION DN. DOWN DR. DOOR D.S. DOWNDRAFT DWG. DRAWING E.A. EXPANSION JOINT ELEC. ELECTRICAL ELEV. ELEVATION E.P. ELECTRICAL PANEL EQ. EQUIPMENT EQPT. EQUIPMENT E.H. EACH WAY EXIST. EXISTING EXT. EXTERIOR FDN. FOUNDATION F.D. FLOOR DRAIN F.E.C. FIRE EXTINGUISHER CABINET F.F. FINISH FLOOR F.N. FINISH FRT. FIXTURE FLOR. FLUORESCENT F.H. FIRE HYDRANT F.O.M. FACE OF MASONRY F.S. FACE OF STUD F.S. FLOOR SINK FTG. FOOTING FUR. FURNISHING FUT. FUTURE GA. GAUGE GALV. GALVANIZED GEN. GENERAL CONTRACTOR G.I. GALVANIZED IRON G.L.B. GLASS LAM BEAM G. GLASS GR. GRADE GYP. GYPSUM G.W.B. GYPSUM WALL BOARD H.B. HOSIERS HDR. HEADER HDW. HARDWARE HT. HEIGHT H.M. HOLLOW METAL HOR. HORIZONTAL H.P. HIGH POINT HTG. HEATING H.W.D. HARDWOOD HVAC HEATING, VENTILATION & AIR CONDITIONING I.D. INSIDE DIAMETER I.E. INVERT ELEVATION INSUL. INSULATION INT. INT. INTERIOR JOINT INT. JOINT J.S.T. JOIST LAM. LAMINATED LAV. LAVATORY M.B. MACHINE BOLT MECH. MECHANICAL MTL. METAL MFR. MANUFACTURER M.H. MAN HOLE N.I.C. NOT IN CONTRACT N. NUMBER NOM. NOMINAL N.T.S. NOT TO SCALE O.A. OVERALL O.C. ON CENTER O.D. OUTSIDE DIAMETER O.F.D. OVERFLOW DRAIN OPNG. OPENING PARTN. PORTLAND CEMENT PLASTER P.L. PROPERTY LINE PLAS. PLASTIC P.V.D. PLYWOOD P.O.C. POINT OF CONNECTION P.T. PRESSURE TREATED Q.T. QUARRY TILE R. RADIUS R.D. ROOF DRAIN REF. REFERENCE REIN. REINFORCEMENT REQD. REQUIRED R.O. ROUGH OPENING R.O.W. RIGHT OF WAY S.A.T. SUSPENDED ACOUSTICAL TILE S.C. SOLID CORE SECT. SECTION SH. SHEET SHTG. SHEATHING SIM. SIMILAR SPEC. SPECIFICATION SQ. SQUARE S. SERVICE SK. SINK SS. STAINLESS STEEL STD. STANDARD STL. STEEL STOR. STORAGE STRUCT. STRUCTURAL S.V. SHUT OFF VALVE SYM. SYMMETRICAL T.B. TOP OF BEAM T.O. TOP OF CURB TEL. TELEPHONE T&G. TONGUE AND GROOVE TH. THICK TKBD. TACKBOARD T.O.P. TOP OF PARAPET T.S. TOP OF SHEATHING T.O.W. TOP OF WALL U.B.C. UNIFORM BUILDING CODE U.O.N. UNLESS OTHERWISE NOTED	VERT. VERTICAL V.T.R. VENT THRU ROOF W.C. WATER CLOSET W.H. WATER HEATER W.R. WATER RESISTANT W.O. WHERE OCCURS W.W.F. WELDED WIRE FABRIC	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SHEET NO.</th> <th>DISCIPLINE CODE</th> <th>TITLE</th> </tr> </thead> <tbody> <tr><td>1.</td><td>G1.0</td><td>COVER SHEET</td></tr> <tr><td>2.</td><td>G1.1</td><td>GENERAL NOTES</td></tr> <tr><td>3.</td><td>C-3</td><td>TEMPORARY TRAILER PLAN</td></tr> <tr><td>4.</td><td>A1.0</td><td>PLOT PLAN</td></tr> <tr><td>5.</td><td>A1.1</td><td>SITE PLAN</td></tr> <tr><td>6.</td><td>S-001</td><td>GENERAL NOTES AND DETAILS</td></tr> <tr><td>7.</td><td>S-111</td><td>MODULAR TRAILER - FOUNDATION PLAN</td></tr> <tr><td>8.</td><td>S-501</td><td>TYPICAL DETAILS</td></tr> <tr><td>9.</td><td>P0.1</td><td>PLUMBING LEGENDS & NOTES</td></tr> <tr><td>10.</td><td>P6.1</td><td>PLUMBING DETAILS</td></tr> <tr><td>11.</td><td>P7.1</td><td>PLUMBING SITE PLAN</td></tr> <tr><td>12.</td><td>E0.0</td><td>CITY OF SAN DIEGO CONSTRUCTION STANDARDS</td></tr> <tr><td>13.</td><td>E1.1</td><td>ELECTRICAL SITE PLAN - NEW</td></tr> <tr><td>14.</td><td>E1.1T</td><td>ELECTRICAL SITE PLAN - NEW</td></tr> <tr><td>15.</td><td>E5.0</td><td>ELECTRICAL PANEL & SINGLE LINE DIAGRAM</td></tr> <tr><td>16.</td><td>E5.1</td><td>ELECTRICAL CALCS</td></tr> <tr><td>17.</td><td>E6.0</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> <tr><td>18.</td><td>E6.1</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> <tr><td>19.</td><td>E6.2</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> <tr><td>20.</td><td>E6.3</td><td>ELECTRICAL T-24 SCHEDULES</td></tr> </tbody> </table>	SHEET NO.	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E6.3	ELECTRICAL T-24 SCHEDULES	<p>BUILDING: CONSTRUCTION OF TEMPORARY FIRE STATION</p> <p>OCCUPANCY: - R-3 (DORM ROOMS, DAYROOM AND TOILETS)</p> <p>CONSTRUCTION TYPE: TYPE V-B</p> <p>ALLOWABLE HEIGHT & STORIES: R-3 OCCUPANCY 40 FEET 3 STORY</p> <p>ACTUAL HEIGHT & STORIES: 14'-0" 1 STORY</p> <p>ACTUAL FLOOR AREA: 1,183 S.F.</p> <p>ALLOWABLE BUILDING FLOOR AREA: UNLIMITED</p> <p>PARKING: STANDARD PARKING STALLS: 23 COMPACT PARKING STALLS: 26 ADA STANDARD ACCESSIBLE: 1 VAN ACCESSIBLE: 1 TOTAL: 24</p> <p>CBC 506.3.2 AMOUNT OF FRONTAGE: PER EQUATION 5-4 $(W = L_1 \times W_1 + L_2 \times W_2 + L_3 \times W_3 + L_4 \times W_4) / F$ $W = (50 \times 30 + 24 \times 30 + 50 \times 30 + 24 \times 30) / 148$ $W = 1,500 + 720 + 1,500 + 720 / 148$ $W = 4,440 / 148$ $W = 30$</p> <p>CBC 506.3.3 AMOUNT OF INCREASE: PER EQUATION 5-5 $I_s = [\sqrt{F_p} - 0.25]^{W_p/30}$ $F = 148 \quad P = 148 \quad W = 30$ $I_s = [\sqrt{148 / 148} - 0.25]^{30/30}$ $I_s = [1 - 0.25]^1$ $I_s = .75 \times 1$ $I_s = .75$</p> <p>PER EQUATION 5-1 $A_u = A_s + (NS \times I_s)$ $A_s = \text{UNLIMITED}$ $NS = \text{UNLIMITED}$ $I_s = .75$ $A_u = [UL + (UL \times .75)]$ $A_u = [UL + UL]$ $A_u = \text{UNLIMITED}$</p> <p>REQUIRED FIRE RESISTANCE FOR BUILDING ELEMENTS</p> <p>EXTERIOR STRUCTURAL FRAMES: NON-RATED INTERIOR BEARING WALLS: NON-RATED INTERIOR NON-BEARING WALLS: NON-RATED INTERIOR STRUCTURAL FRAMES: NON-RATED FLOORS & FLOOR/CEILINGS: NON-RATED ROOFS & ROOF/CEILING: NON-RATED STAIRWAY CONSTRUCTION: NON-RATED</p>	<p>ARCHITECT: ERIC DAVY DAVY ARCHITECTURE 1053 TENTH AVENUE SAN DIEGO, CA 92101 619-238-3811 CONTACT: MIKE VANDERHOOF EMAIL: MVANDERHOOF@DAVYARCHITECTURE.COM</p> <p>CIVIL: OMEGA ENGINEERING CONSULTING 4340 VIEWRIDGE AVENUE, SUITE B SAN DIEGO, CA 92123 585-634-8620 CONTACT: SEAN SAVAGE EMAIL: SEAN@OMEGA-CONSULTANTS.COM</p> <p>MECHANICAL & PLUMBING: WALSH ENGINEERINGS 4711 VIEWRIDGE AVENUE, SUITE 210 SAN DIEGO, CA 92123 858-541-0788 CONTACT: MARK HYDE EMAIL: MHYDE@WALSHENG.COM</p> <p>ELECTRICAL: NEDC, INC 3103 FALCON STREET, SUITE J SAN DIEGO, CA 92103 619-278-0076 CONTACT: DAVID NUTTER EMAIL: DAVID@NEDINC.NET</p>
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<p>APPLICABLE CODES</p> <p>1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH: 1.1. 2016 CALIFORNIA BUILDING CODE 1.2. CALIFORNIA CODE REGULATIONS: TITLE 8, INDUSTRIAL CODES TITLE 19, PUBLIC SAFETY TITLE 21, PUBLIC WORKS TITLE 24, BUILDING STANDARDS 1.3. AMERICANS WITH DISABILITIES ACT CALIFORNIA CODE OF REGULATIONS, 2016; 2. ALL BARRIER-FREE ITEMS SHALL COMPLY WITH TITLE 21 AND 24 OF THE CALIFORNIA CODE OF REGULATIONS, 2016; 3. ALL WORK AND MATERIALS SHALL BE IN FULL ACCORDANCE WITH THE REQUIREMENTS OF THESE CODES AND ALL APPLICABLE LOCAL ORDINANCES. WHERE CONTRACT DOCUMENTS EXCEED W/OUT VIOLATING CODE AND REGULATIONS REQUIREMENTS, CONTRACT DOCUMENTS TAKE PRECEDENCE. WHERE CODES CONFLICT, THE MORE STRINGENT SHALL APPLY. 4. PROTECTION DURING WELDING: CONFORM TO TITLE 8, C.C.R., FURTHER PROTECT OCCUPANTS AND THE GENERAL PUBLIC WITH PORTABLE SOLID VISION BARRICADES AROUND LOCATION WHERE WELDING IS BEING PERFORMED. PROVIDE SIGNS WARNING AGAINST LOOKING AT WELDING W/OUT PROPER EYE PROTECTION OR EQUIVALENT. 5. DURING THE ENTIRE CONSTRUCTION PERIOD, IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN CONDITIONS AT THE PROJECT SITE TO MEET THE REQUIREMENTS OF CALIFORNIA OCCUPANCY REGULATIONS. 6. ALL ACCESS ROADS AND FIRE HYDRANTS SHALL BE INSTALLED AND FULLY USABLE PRIOR TO LOADING THE SITE WITH CONSTRUCTION MATERIALS. 7. OTHER APPLICABLE CODES AND STANDARDS: 2016 BUILDING STANDARDS ADMINISTRATIVE CODE, PART 1, TITLE 24 C.C.R. 2016 CALIFORNIA BUILDING CODE (CBC), PART 2, TITLE 24 C.C.R. (2015 INTERNATIONAL BUILDING CODE VOLUMES 1-2 AND CALIFORNIA AMENDMENTS) 2016 CALIFORNIA ELECTRICAL CODE (CEC), PART 3, TITLE 24 C.C.R. (2014 NATIONAL ELECTRICAL CODE AND 2016 CALIFORNIA AMENDMENTS) 2016 CALIFORNIA MECHANICAL CODE (CMC), PART 4, TITLE 24 C.C.R. (2012 INTERNATIONAL MECHANICAL CODE AND 2013 CALIFORNIA AMENDMENTS) 2016 CALIFORNIA PLUMBING CODE (CPC), PART 5, TITLE 24 C.C.R. (2012 UNIFORM PLUMBING CODE AND 2013 CALIFORNIA AMENDMENTS) 2016 CALIFORNIA ENERGY CODE, PART 6, TITLE 24 C.C.R. 2016 CALIFORNIA FIRE CODE (CFC), PART 9, TITLE 24 C.C.R. (2015 INTERNATIONAL FIRE CODE AND CALIFORNIA AMENDMENTS) 2016 GREEN CALIFORNIA BUILDING STANDARDS, CALGREEN CODE, TITLE 24 C.C.R. 2016 CALIFORNIA REFERENCED STANDARDS, PART 12, TITLE 24 C.C.R. TITLE 19 C.C.R., PUBLIC SAFETY, STATE FIRE MARSHAL REGULATIONS 2007 SAFETY CODE FOR ELEVATORS AND ESCALATORS (ASTM A17.1/CSA B44-2007) (WITH A17.1A/CSA B44A-08 ADDENDA) NFPA 13 AUTOMATIC SPRINKLER SYSTEMS, 2013 EDITION NFPA 14 STANDPIPE SYSTEMS (CA AMENDED), 2013 EDITION NFPA 17 DRY CHEMICAL EXTINGUISHING SYSTEMS, 2013 EDITIONS NFPA 17A WET CHEMICAL SYSTEMS, 2013 EDITION NFPA 20 STATIONARY PUMPS, 2013 EDITION NFPA 22 WATER TANKS, 2013 EDITION NFPA 24 PRIVATE FIRE MAINS (CA AMENDED), 2013 EDITION NFPA 72 NATIONAL FIRE ALARM CODE (CAL. AMENDED), 2013 EDITION (NOTE SEE UL STANDARD 1971 FOR "VISUAL DEVICES") NFPA 80 FIRE DOOR AND OTHER OPENING PROTECTIVES, 2013 EDITION NFPA 253 CRITICAL RADIANT FLUX OF FLOOR COVERING SYSTEMS, 2006 EDITION NFPA 2001 CLEAN AGENT FIRE EXTINGUISHING SYSTEMS, 2012 EDITION REFERENCE CODE SECTION FOR NFPA STANDARDS - 2016 CBC (SFM) CH. 35</p>		<p>SCOPE OF WORK</p> <p>TEMPORARY FACILITY DURING CONSTRUCTION (±10 MONTHS) TO CONTAIN A STATE APPROVED COMMERCIAL COACH WITH STATE APPROVED FOUNDATION, STATE APPROVED ENTRY PLATFORM WITH RAMP/STAIRS. THE STATE APPROVED COMMERCIAL COACH AND STATE APPROVED RAMP/STAIR SHALL COMPLY WITH ALL APPLICABLE ACCESSIBILITY REQUIREMENTS. PAVING AND UTILITY CONNECTIONS AS SHOWN INCLUDING TEMPORARY EMERGENCY GENERATOR.</p> <p>*NOTE: STATE APPROVED COACH AND FOUNDATION DRAWINGS/CALCS. ARE NOT REQUIRED AS FOR THIS PERMIT/PROJECT AS LONG AS STATE APPROVED SYSTEMS ARE USED/INSTALLED PER BUILDING/OFFICIAL. SEE REFERENCE PLANS FOR ADDITION INFORMATION.</p>																																																																	
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<p>WARNING</p> <p>IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE</p>		<p>CONTRACTOR'S RESPONSIBILITY</p> <p>1. PURSUANT TO SECTION 4216 OF THE CALIFORNIA GOVERNMENT CODE, AT LEAST 2 WORKING DAYS PRIOR TO EXCAVATION, YOU MUST CONTACT THE REGIONAL NOTIFICATION CENTER (E.G. UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA) AND OBTAIN AN INQUIRY IDENTIFICATION NUMBER. 2. NOTIFY SDG&E AT LEAST 10 WORKING DAYS PRIOR TO EXCAVATING WITHIN 10' OF SDG&E UNDERGROUND HIGH VOLTAGE TRANSMISSION POWER LINES. (I.E., 69 KV & HIGHER)</p>																																																																	
<p>DECLARATION OF RESPONSIBLE CHARGE</p> <p>I AM THE DESIGNER IN RESPONSIBLE CHARGE OF THIS TENANT IMPROVEMENT PROJECT. I HAVE INSPECTED THE SITE / PREMISES AND DETERMINED THAT EXISTING CONDITIONS ARE IN FULL COMPLIANCE WITH CURRENT SITE ACCESSIBILITY REQUIREMENTS TO THE EXTENT REQUIRED BY LAW.</p> <p>PRINT NAME: ERIC DAVY SIGNATURE: <i>Eric Davy</i> DATE: 04/06/2018</p>		<p>VICINITY MAP (NOT TO SCALE)</p>																																																																	
<p>PLANS FOR THE CONSTRUCTION OF FIRE RESCUE - TEMPORARY FACILITY</p> <p style="text-align: right; font-size: 24px; font-weight: bold;">G1.0</p> <p style="text-align: center; font-weight: bold;">COVER SHEET</p>		<p>CONSULTANT</p> <p>DAVY ARCHITECTURE 1053 TENTH AVENUE SAN DIEGO, CA 92101 PHONE 619.238.3811 FAX 619.238.0442 www.davyarchitecture.com</p> <p>ALL IDEAS, ARRANGEMENTS AND PLANS INDICATED OR REPRESENTED BY THIS DRAWING ARE OWNED BY AND THE PROPERTY OF ERIC DAVY ARCHITECTS, APC AND WERE CREATED, EVALUATED AND DEVELOPED FOR THE USE ON AND IN CONNECTION WITH THE SPECIFIED PROJECT. NONE OF SUCH IDEAS, DESIGNS, ARRANGEMENTS OR PLANS SHALL BE USED BY, OR DISCLOSED TO ANY PERSON, FIRM OR CORPORATION FOR ANY PURPOSE WHATSOEVER WITHOUT THE WRITTEN PERMISSION OF ERIC DAVY ARCHITECTS, APC. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB, AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS.</p>																																																																	
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GENERAL NOTES

- THE GENERAL CONTRACTOR & ALL SUBCONTRACTORS SHALL CAREFULLY & THOROUGHLY EXAMINE THE PROJECT SITE, FIELD VERIFY ALL CONDITIONS, GRADES, ELEVATIONS & DIMENSIONS OF THE VARIOUS FEATURES OF THE EXISTING SITE CONDITIONS. ANY DISCREPANCIES &/OR CONDITIONS NEEDING CLARIFICATION SHALL BE REPORTED IMMEDIATELY TO THE ARCHITECT BEFORE BEGINNING WORK.
- ALL PROPERTY LINES, EASEMENTS AND BUILDINGS, BOTH EXISTING AND PROPOSED, THAT HAVE BEEN DIVULGED TO THE ARCHITECT, ARE SHOWN ON THE SITE PLAN.
- THE GENERAL CONTRACTOR & ALL SUBCONTRACTORS SHALL BE SOLELY RESPONSIBLE FOR THE ENFORCEMENT OF ALL REQUIREMENTS & REGULATIONS & SHALL PERFORM ALL WORK ON THIS PROJECT IN COMPLIANCE WITH CAL O.S.H.A., THE INDUSTRIAL ACCIDENT COMMISSION OF THE STATE OF CALIFORNIA, & ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS. ALL CONSTRUCTION FABRICATION & INSTALLATIONS SHALL CONFORM TO THE LATEST ADOPTED EDITIONS OF THE C.B.C., C.P.C., C.E.C., & ANY OTHER FEDERAL, STATE AND LOCAL CODES, REGULATIONS & ORDINANCES OF THE GOVERNING AGENCY HAVING JURISDICTION OVER THE PROJECT.
- DUE TO THE REPROGRAPHIC PROCESS, THESE PLANS MAY NOT BE ACCURATE TO SCALE. ALL DIMENSIONS SHALL TAKE PRECEDENCE OVER THE SCALE SHOWN & IN NO CASE SHALL WORKING DIMENSIONS BE SCALED FROM THE PLANS, SECTIONS, ELEVATIONS OR DETAILS.
- WHERE CONSTRUCTION DETAILS ARE NOT SHOWN OR NOTED FOR ANY PART OF THE WORK, DETAILS SHALL BE THE SAME AS FOR OTHER SIMILAR FIRST CLASS WORK FOR THE TRADE INVOLVED. THE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY, IN WRITING, OF ANY ALTERNATE, NON-STANDARD, OR UNTESTED METHOD(S) PROPOSED.
- THE STRUCTURAL, MECHANICAL, PLUMBING & ELECTRICAL DRAWINGS ARE SUPPLEMENTARY TO THE ARCHITECTURAL DRAWINGS. SHOULD THERE BE ANY DISCREPANCY BETWEEN THE VARIOUS DRAWINGS, IT SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION FOR CLARIFICATION.
- THE CONTRACTOR SHALL CONSULT THE ELECTRICAL, MECHANICAL, & PLUMBING DRAWINGS FOR LOCATION OF ALL ROUGH OPENINGS THROUGH WALLS & FLOOR SLABS & NOTIFY THE ARCHITECT OF ANY ITEMS THAT DO NOT CONFORM WITH THE INTENT INDICATED ON THESE DRAWINGS.
- THE CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REPRESENTATIVE FOR INSTALLATION OF ANY SPECIAL EQUIPMENT NOT SHOWN IN THESE DRAWINGS. THE CONTRACTOR SHALL VERIFY EQUIPMENT LOCATIONS WITH THE OWNER'S REPRESENTATIVE AND/OR EQUIPMENT MANUFACTURER FOR PROPER SIZE AND LOCATION OF FOUNDATION OR SLAB DEPRESSIONS, DRAINS, AND WARPS.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO LOCATE & PROTECT ANY UNDERGROUND OR CONCEALED CONDUIT, PLUMBING, OR OTHER UTILITIES WHERE NEW WORK IS BEING PERFORMED.
- DIMENSIONS ARE TYPICAL TO FACE OF MASONRY OR CONCRETE AND TO CENTERLINE OF STUD, UNLESS OTHERWISE NOTED. LARGER SCALE DETAILS GOVERN OVER SMALLER SCALE DETAILS.
- THE CONTRACTOR SHALL VERIFY THE SIZE AND LOCATION OF ALL UTILITY LINES AND STUBS TO THE BUILDING(S) AS MAY BE INDICATED ON THE PLANS. THE CONTRACTOR SHALL BE REQUIRED TO BRING ALL UTILITY LINES (WATER, SEWER, GAS AND ELECTRICAL) INTO THE BUILDING FROM POINTS AS INDICATED ON THE PLANS, READY FOR SERVICE.
- THE CONTRACTOR SHALL COMPLY WITH SAFETY RESTRICTIONS AS REQUIRED FOR WORKERS AND PEDESTRIAN PROTECTION DURING THE ENTIRE CONSTRUCTION PROCESS.
- RUBBISH AND DEBRIS RESULTING FROM THE WORK OF VARIOUS TRADES SHALL BE REGULATED, COLLECTED AND REMOVED FROM THE PROJECT SITE AND LEGALLY DISPOSED OF PRIOR TO DELIVERY OF MATERIALS TO THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REPRESENTATIVE FOR AN ACCEPTABLE ACCESS ROUTE AND TIME. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR, HIS SUBCONTRACTORS, OR ANY OF THEIR EMPLOYEES USE ANY AREA OUTSIDE THE CONSTRUCTION ZONE WITHOUT PRIOR CLEARANCE FROM THE OWNER'S REPRESENTATIVE.
- ANY REVISION OR ADDITIONAL WORK REQUIRED DUE TO FIELD CONDITIONS OR LOCAL GOVERNING AUTHORITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT BEFORE PROCEEDING REGARDLESS OF COST, TIME OR MATERIAL INCREASE.
- THE CONTRACTOR SHALL PROVIDE PROTECTION AS REQUIRED TO PREVENT ANY DAMAGE TO MATERIALS & CONSTRUCTION PREVIOUS TO & DURING CONSTRUCTION & AFTER INSTALLATION, AS WELL AS EXISTING CONSTRUCTION ADJACENT TO THE JOB SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL FINISHES & MATERIALS, & FOR REPAIRING AND/OR REPLACING ALL ITEMS THAT ARE DAMAGED OR SOILED DURING CONSTRUCTION AS REQUIRED TO THE OWNER'S APPROVAL AT NO ADDITIONAL COST TO THE OWNER.
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CODES LISTED UNDER THE PROJECT DATA HEADING ON THIS SHEET. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH ALL CODES AND ORDINANCES, CITY OR STATE, AS REQUIRED FOR THE CONSTRUCTION OF THIS PROJECT. WHERE ANY CONFLICTS OCCUR BETWEEN FEDERAL, STATE AND LOCAL LAWS, CODES, ORDINANCES, AND REGULATIONS, THE MOST STRINGENT SHALL GOVERN.
- ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE REQUIREMENTS OF BOTH THE CALIFORNIA BUILDING CODE AND TITLE 24, CALIFORNIA CODE OF REGULATIONS (C.C.R.).
- IT IS THE INTENT OF THESE DRAWINGS TO INDICATE A COMPLETE AND FINISHED PRODUCT MATCHING AND/OR ABUTTING EXISTING CONSTRUCTION IN A NEAT AND PROFESSIONAL MANNER.
- ALL ITEMS TO BE REMOVED AND RELOCATED OR REPLACED SHALL BE HANDLED WITH PROPER CARE AND STORED IN A SAFE LOCATION TO PREVENT DAMAGE, OR BE REPLACED AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR UTILITY SHUTDOWNS TO THE OWNER'S REPRESENTATIVE AT LEAST 3 DAYS PRIOR TO THE EVENT. WORK REQUIRING SHUTDOWNS MAY BE REQUIRED TO BE PERFORMED OUTSIDE NORMAL WORK HOURS.
- IF WORK ADJAINS AREAS THAT WILL BE OCCUPIED DURING CONSTRUCTION, THE CONTRACTOR AND SUBCONTRACTORS SHALL COOPERATE WITH THE OWNER TO MAINTAIN CONTINUOUS OPERATION. IF CONFLICTS OCCUR, THE INTERESTS OF THE OWNER SHALL GOVERN. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO MINIMIZE THE IMPACT OF CONSTRUCTION IN AFFECTED AREAS.
- DUST SCREENS OF EITHER PLASTIC CURTAINS OR PLYWOOD PARTITIONS SHALL BE MAINTAINED ADJACENT TO & SEPARATING AREAS OF CONSTRUCTION FROM ADJOINING OCCUPIED AREAS. SCREENS SHALL EXTEND A DISTANCE TO ALLOW WORK WITHOUT DISRUPTING THE ADEQUATE FUNCTIONING OF THE FACILITY CIRCULATION. SCREENS SHALL BE RELOCATED AS NECESSARY FOR EA. PHASE OF THE PROJECT. CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REP. FOR THE SCREEN LOCATIONS.
- ALL REQUIRED EXITS FROM OCCUPIED PORTIONS OF THE BUILDING MUST BE MAINTAINED AT ALL TIMES. THE CONTRACTOR SHALL ESTABLISH PROCEDURES TO MINIMIZE CIRCULATION OF CONSTRUCTION PERSONNEL AND MATERIALS THROUGH OCCUPIED PORTIONS OF THE BUILDING. THE CONTRACTOR SHALL IMMEDIATELY CLEAN DUST AND DIRT FROM CORRIDOR AREAS NOT PROTECTED BY DUST SCREENS.
- STORAGE OF ALL MATERIALS, EQUIPMENT & SUPPLIES SHALL BE LIMITED TO SCHEDULED AREAS OF WORK IN PROGRESS, OR DESIGNATED EXTERIOR LOCATIONS APPROVED BY & ARRANGED W/ THE OWNER.

GENERAL NOTES CONT'D

- THE CONTRACTOR SHALL PROVIDE ALL NECESSARY BLOCKING, BACKING, FRAMING, HANGERS OR OTHER SUPPORT FOR ALL FIXTURES, EQUIPMENT, CASEWORK, FURNISHINGS AND ALL OTHER ITEMS AS REQUIRED, INCLUDING BUT NOT LIMITED TO: TOWEL BARS, GRAB BARS, WINDOW TREATMENT, TELEPHONE BACKBOARDS, WATER HEATERS, AND CABINTRY.
- THE GENERAL CONTRACTOR SHALL NOT MAKE ANY SUBSTITUTION OF MATERIALS OR EQUIPMENT WITHOUT THE WRITTEN CONSENT OF THE OWNER AND THE ARCHITECT.
- COMPLETED CONSTRUCTION SHALL BE CLEANED, LABELS REMOVED, & ALL OTHER TOUCH-UP COMPLETED TO THE SATISFACTION OF THE OWNER PRIOR TO FINAL ACCEPTANCE.
- WHERE PAVING, WALKS AND/OR LANDSCAPED AREAS ARE DISTURBED OR DAMAGED DURING CONSTRUCTION, THEY SHALL BE REPAIRED OR REPLACED TO MATCH EXISTING CONDITIONS AT CONTRACTORS EXPENSE.
- THE GENERAL CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY SPECIFIED MATERIALS OR EQUIPMENT WHICH ARE EITHER UNAVAILABLE OR WILL CAUSE A DELAY IN THE CONSTRUCTION COMPLETION SCHEDULE.
- ALL GYPSUM BOARD SURFACES, WALLS AND CEILINGS SHALL BE TAPED AND FEATHERED SMOOTH TO RECEIVE WALL FINISH. ALL WALLS AND CEILINGS SHALL RECEIVE A MINIMUM OF ONE COAT SEALER AND PAINT TO COVER. WATER RESISTANT TYPE "GREEN" BOARD SHALL BE USED IN ALL RESTROOMS, SHOWERS, AND EXTERIOR AREAS.
- THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING TEMPORARY ELECTRICAL POWER TO THE JOB SITE FOR USE BY ALL CONSTRUCTION TRADES.
- ALL SUBCONTRACTORS SHALL MAINTAIN THE PREMISES CLEAN AND FREE FROM ALL TRASH AND DEBRIS. THE FIXTURES, EQUIPMENT, GLAZING, FLOORS, ETC. SHALL BE LEFT CLEAN AND READY FOR EITHER THE NEXT TRADE OR OCCUPANCY.
- NO HAZARDOUS MATERIALS SHALL BE USED OR STORED AT THE PROJECT SITE WHICH EXCEED THE QUANTITIES LISTED IN U.B.C. TABLE 3-D AND 3-E.
- SIDE YARDS USED FOR AREA INCREASES SHALL BE PERMANENTLY MAINTAINED.
- THE CONTRACTOR SHALL THOROUGHLY CAULK, FLASH &/OR SEAL AROUND ALL WALL &/OR ROOF PENETRATIONS THAT ARE MADE AS PART OF THE CONTRACT WORK TO CREATE A WATERTIGHT CONDITION.
- ALL PENETRATIONS INTO SOUND RATED PARTITIONS, FLOORS, OR CEILING ASSEMBLIES SHALL BE SEALED WITH APPROVED RESILIENT ACOUSTICAL SEALANT. ELECTRICAL DEVICES, RECESSED ITEMS, ETC. SHALL BE SEALED OR LINED TO MAINTAIN THE INTEGRITY OF THE ACOUSTIC ASSEMBLY.
- ALL ELECTRICAL, MECHANICAL AND PLUMBING PENETRATIONS THROUGH FIRE RESISTIVE AREA SEPARATION AND CORRIDOR ASSEMBLIES, INCLUDING CONDUITS AND PIPING, SHALL BE TIGHTLY AND SOLIDLY SEALED WITH AN APPROVED FIRE STOPPING COMPOUND OF I.C.B.O. #1697 OR APPROVED EQUAL. WHERE SERVICES PENETRATE AN AREA SEPARATION WALL, THE SECTION PASSING THROUGH THE WALL SURFACE AND THE FIXTURE CONNECTIONS THERETO SHALL BE ONLY OF METAL. FLOOR OPENINGS SHALL BE ENCLOSED BY A RATED SHAFT OF FIRE RESISTIVE CONSTRUCTION AS REQUIRED BY U.B.C. TABLE 17A, SECTION 1706.
- ALL PENETRATIONS THROUGH FIRE RATED WALLS, FLOORS AND CEILINGS SHALL BE SEALED W/ A MATERIAL CAPABLE OF PREVENTING THE PASSAGE OF HOT GASSES WHEN SUBJECTED TO THE REQUIREMENTS OF A.S.T.M. E-814 AND AS PRESCRIBED IN STATE FIRE MARSHAL STANDARD 43-1. USE 3M / UL SYSTEM #147 OR ARCHITECT APPROVED EQUAL.
- IN BUILDINGS OTHER THAN DWELLING OR HOTEL OCCUPANCIES HAVING FLOORS AND ROOFS OF WOOD FRAME CONSTRUCTION, A DRAFT STOP SHALL BE PLACED IN THE AREA BETWEEN THE CEILING AND THE FLOOR ABOVE SO THAT NO CONCEALED SPACE EXCEEDS 1,000 SF AND NO HORIZONTAL DIMENSION EXCEEDS 60 LF (IF THE SPACE IS SPRINKLERED, THEN 3,000 SF AND 100 LF RESPECTIVELY).
- ALL OPENINGS IN 1-HOUR CORRIDOR WALLS AND CEILINGS ARE TO BE PROTECTED. DOORS AND FRAMES MUST BE LABELED 20-MINUTE, WITH SMOKE AND DRAFT CONTROL ASSEMBLIES AND SELF-CLOSERS OR AUTOMATIC CLOSERS WITH SMOKE DETECTORS. GLAZING MUST BE 1/4" THICK WIRED GLASS INSTALLED IN STEEL FRAMES, AREA NOT TO EXCEED 25% OF THE AREA OF THE COMMON WALLS.
- ALL EXIT DOORS ARE TO BE OPERABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE. FLUSH BOLTS OR SURFACE BOLTS ARE PROHIBITED (ALSO APPLIES TO GATES); PROVIDE A SIGN ON OR NEAR THE MAIN EXIT DOOR READING: "THIS DOOR TO REMAIN UNLOCKED DURING BUSINESS HOURS" PER U.B.C. SECTION 1004.3.
- THE MAXIMUM EFFORT REQUIRED 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, AND AT THE CENTER PLANE OF SLIDING OR FOLDING DOORS. WHEN FIRE DOORS ARE REQUIRED, THE MAXIMUM EFFORT TO OPERATE THE DOOR MAY BE INCREASED TO 15 LBS WHEN ALLOWED BY AUTHORITY HAVING JURISDICTION.
- ALL DOOR HARDWARE TO BE LEVER-TYPE PER STATE OF CALIFORNIA AND SHALL BE INSTALLED @ 3'-0" A.F.F., UNLESS OTHERWISE NOTED.
- PROVIDE FLOOR MOUNTED STOPS, 4" MAX. FROM WALL FOR ALL DOORS UNLESS OTHERWISE NOTED.
- ALL PRIMARY ENTRANCES TO THE BUILDING SHALL BE ACCESSIBLE PER C.B.C. CHAPTER 11. BUILDING ENTRANCES SHALL BE IDENTIFIED BY SIGN WITH THE INTERNATIONAL SYMBOL OF ACCESSIBILITY, A WHITE FIGURE ON A BLUE BACKGROUND, PER C.B.C. SECTION 1117B.5.8.11.
- ALL DOORS LEADING TO ACCESSIBLE RESTROOMS SHALL HAVE RAISED TRIANGLE AND CIRCLE IDENTIFICATION SYMBOLS PER U.B.C. SECTION 1117B.
- THE MAXIMUM UNDERCUT OF ALL DOORS SHALL NOT EXCEED 1/2" ABOVE THE FINISHED FLOOR SURFACE. CONTRACTOR TO VERIFY ALL FLOOR FINISHES.
- EXIT SIGNS SHALL BE CONNECTED TO AN EMERGENCY ELECTRICAL SYSTEM PER C.B.C. SECTION 1011.4 WITH THE EXCEPTION OF AN APPROVED SELF-ILLUMINOUS EXIT SIGN THAT PROVIDES CONTINUOUS ILLUMINATION INDEPENDENT OF AN EXTERNAL POWER SOURCE. THE COLOR AND DESIGN OF LETTERING, ARROWS AND OTHER SYMBOLS ON EXIT SIGNS SHALL BE IN HIGH CONTRAST WITH THEIR BACKGROUND PER C.B.C. SECTION 1011.5.1
- THE PATH OF EXIT TRAVEL SHALL BE IDENTIFIED BY EXIT SIGNS PER C.B.C. SECTION 1011.3 & 1117B.5. EXIT SIGNS SHALL BE READILY VISIBLE FROM ANY DIRECTION OF APPROACH. EXIT SIGNS SHALL BE LOCATED AS NECESSARY TO CLEARLY INDICATE THE DIRECTION OF EXIT TRAVEL. ALL EXIT SIGNS SHALL BE INTERNALLY ILLUMINATED WITH MINIMUM 6" HIGH LETTERS PER C.F.C. SECTION 12.108(a) AND C.B.C. SECTION 1013.3. THE CONTRACTOR SHALL COORDINATE LOCATION OF ALL EXIT SIGNS WITH ARCHITECT.
- EACH VENT SHALL RISE VERTICALLY TO A POINT NOT LESS THAN SIX (6) INCHES ABOVE THE FLOOD-LEVEL RIM OF THE FIXTURE SERVED BEFORE OFFSETTING HORIZONTALLY OR BEFORE BEING CONNECTED TO ANY OTHER VENT.

GENERAL NOTES CONT'D

- THE MEANS OF EGRESS SHALL BE ILLUMINATED AT AN INTENSITY OF NOT LESS THAN 1 FOOTCANDLE AT THE FLOOR LEVEL ANY TIME A BUILDING IS OCCUPIED PER C.B.C. SECTION 1003.2.9.1. THE MEANS OF EGRESS SHALL EXTEND THE LENGTH OF THE EXIT DISCHARGE TO THE PUBLIC WAY.
- EXISTS, EXIT SIGNS, FIRE ALARM PANELS, HOSE CABINETS, FIRE EXTINGUISHER LOCATIONS, AND STANDPIPE CONNECTIONS SHALL NOT BE CONCEALED BY CURTAINS, MIRRORS, OR OTHER DECORATIVE MATERIAL.
- THE EGRESS PATH SHALL REMAIN FREE AND CLEAR OF ALL OBSTRUCTIONS AT ALL TIMES. NO STORAGE IS PERMITTED IN ANY EGRESS PATHS.
- AFTER THE PROJECT IS OCCUPIED, ANY CHANGE IN USE OR OCCUPANCY WHICH CAUSES AN INCREASE IN OCCUPANT LOAD SHALL COMPLY WITH ALL OF THE REQUIREMENTS FOR THE INCREASED LOAD.
- THERE WILL BE NO FOOD SALES TO THE PUBLIC IN THIS FACILITY.

STRUCTURAL NOTES

- NOTICE TO APPLICANT/OWNER'S AGENT/ARCHITECT, OR ENGINEER OF RECORD: BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION/INSTALLATION OF THE WORK SPECIFIED HEREIN, YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF THE CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.
- NOTICE TO THE CONTRACTOR/BUILDER/INSTALLER/SUB-CONTRACTOR/OWNER-BUILDER: BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION/INSTALLATION OF THE WORK SPECIFIED HEREIN, YOU ACKNOWLEDGE AND ARE AWARE OF THE REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS, YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF THE CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING, AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.

FIRE NOTES

- LOCATION AND CLASSIFICATIONS OF EXTINGUISHERS SHALL BE IN ACCORDANCE WITH CFC 906 AND CALIFORNIA CODE OF REGULATIONS (CCR), Title 19.
- DURING CONSTRUCTION, AT LEAST ONE EXTINGUISHER SHALL BE PROVIDED AN EACH FLOOR LEVEL AT EACH STAIRWAY, IN ALL STORAGE AND CONSTRUCTION SHEDS, IN LOCATIONS WHERE FLAMMABLE OR COMBUSTIBLE LIQUIDS ARE STORED OR USED, AND WHERE OTHER SPECIAL HAZARDS ARE PRESENT PER CFC SECTION 3315.1.
- BUILDINGS UNDERGOING CONSTRUCTION, ALTERATION, OR DEMOLITION SHALL CONFORM TO CFC CHAPTER 33, WELDING, CUTTING, AND OTHER HOT WORK SHALL BE IN CONFORMANCE WITH CFC CHAPTER 35.
- OPEN FLAMES, FIRE, AND BURNING ON ALL PREMISES IS PROHIBITED EXCEPT AS SPECIFICALLY PERMITTED BY THE CITY OF SAN DIEGO AND CFC 308.
- WALL, FLOOR AND CEILING FINISHES AND MATERIALS SHALL NOT EXCEED THE INTERIOR FINISH CLASSIFICATIONS IN THE CBC TABLE 803.9 AND SHALL MEET THE FLAME PROPAGATION PERFORMANCE CRITERIA OF THE CALIFORNIA CODE OF REGULATIONS, TITLE 19, DIVISION 1, DECORATIVE MATERIALS SHALL BE PROPERLY TREATED BY A PRODUCT OR PROCESS APPROVED BY THE STATE FIRE MARSHAL WITH APPROPRIATE DOCUMENTATION PROVIDED TO THE CITY OF SAN DIEGO.
- DUMPSTERS AND TRASH CONTAINERS EXCEEDING 1.5 CUBIC YARDS SHALL NOT BE STORED IN BUILDINGS OR PLACED WITHIN 5 FEET OF COMBUSTIBLE WALLS, OPENINGS OR COMBUSTIBLE ROOF EAVE LINES UNLESS PROTECTED BY AN APPROVED SPRINKLER SYSTEM OR LOCATED IN A TYPE I OR IIA STRUCTURE SEPARATED BY 10 FEET FROM OTHER STRUCTURES. CONTAINERS LARGER THAN 1 CUBIC YARD SHALL BE OF NON-OR LIMITED-COMBUSTIBLE MATERIALS OR SIMILARLY PROTECTED OR SEPARATED. CFC 304.3.

RAMPS & STAIRWAY NOTES

- STAIRWAYS SHALL HAVE HANDRAILS ON EACH SIDE, AND EVERY STAIRWAY REQUIRED TO BE MORE THAN 88" IN WIDTH SHALL BE PROVIDED WITH NOT LESS THAN ONE INTERMEDIATE HANDRAIL FOR EACH 88" OF REQUIRED WIDTH. INTERMEDIATE HANDRAILS SHALL BE SPACED APPROXIMATELY EQUALLY ACROSS THE ENTIRE WIDTH OF THE STAIRWAY. (Sec. 1003.3.8.1a)
- HANDRAILS TO BE 34" TO 38" ABOVE THE NOSING OF THE TREADS. (Sec. 1133B.4.2.1 and Fig. 11B-35)
- HANDRAILS SHALL EXTEND A MINIMUM OF 12" BEYOND THE TOP NOSING AND 12" PLUS THE TREAD WIDTH BEYOND THE BOTTOM NOSING. (Sec. 1133B.4.2.2 and Fig. 11B-37)
- THE HANDGRIP PORTION OF HANDRAILS SHALL BE NOT LESS THAN 1-1/4 INCHES NOR MORE THAN 1-1/2 INCHES IN CROSS SECTIONAL NOMINAL DIMENSION OR THE SHAPE SHALL PROVIDE AN EQUIVALENT GRIPPING SURFACE. (Sec. 1133B.4.2.6)
- WHERE STAIRWAYS OCCUR OUTSIDE A BUILDING, THE UPPER APPROACH AND ALL TREADS SHALL BE MARKED BY A STRIP OF CLEARLY CONTRASTING COLOR AT LEAST 2" AND NO MORE THAN 4" WIDE AND PLACED PARALLEL TO AND NOT MORE THAN 1" FROM THE NOSE OF THE STEP OR LANDING TO ALERT THE VISUALLY IMPAIRED. THE STRIP SHALL BE OF A MATERIAL THAT IS AT LEAST AS SLIP-RESISTANT AS THE OTHER TREADS OF THE STAIR. A PAINTED STRIP SHALL BE ACCEPTABLE. (Sec. 1133B.4.4 & Fig. 11B-35)
- ALL TREADS SURFACES SHALL BE SLIP-RESISTANT. WEATHER EXPOSED STAIRS AND THEIR APPROACHES SHALL BE DESIGNED SO THAT WATER WILL NOT ACCUMULATE ON WALKING SURFACES. TREADS SHALL HAVE MINIMUM SMOOTH, ROUNDED, OR CHAMFERED, EXPOSED EDGES, AND NO ABRUPT EDGES, AND NO ABRUPT EDGES AT THE NOSING (front edge) (Sec. 1133B.4.5.1) THE NOSING SHALL NOT PROJECT MORE THAN 1-1/2" PAST THE FACE OF THE RISER BELOW. (Sec. 1134.5.1 & Fig. 11B-35)
- WHERE STAIRS OCCUR INSIDE A BUILDING, THE UPPER APPROACH AND LOWEST TREAD ON EACH FLIGHT OR INTERIOR STAIRS SHALL BE MARKED WITH A STRIPE OF CLEARLY CONTRASTING COLOR AT LEAST 2" WIDE AND PARALLEL TO AND NOT MORE THAN 1" FROM THE NOSE OR LANDING. (Sec. 1133B.4.4 & Fig. 11B-35)

CAL GREEN NOTES

- ADHESIVES, SEALANTS, CAULKS, ADHESIVES AND SEALANTS USED ON THE PROJECT SHALL MEET THE REQUIREMENTS OF THE FOLLOWING STANDARDS, (SECTION 5.504.4.1 OF CAL GREEN) ADHESIVES, ADHESIVE BONDING PRIMERS, ADHESIVE PRIMERS, SEALANTS, SEALANT PRIMERS, AND CAULKS SHALL COMPLY WITH LOCAL OR REGIONAL AIR POLLUTION CONTROL OR AIR QUALITY MANAGEMENT DISTRICT RULES WHERE APPLICABLE, OR SCAQMD RULE 1168 VOC LIMITS, AS SHOWN IN TABLE 5.504.4.1 AND 5.504.4.2 OF CALGREEN. (SEC. 5.504.4.1)
- A LETTER FROM THE CONTRACTOR AND OR THE BUILDING OWNER CERTIFYING WHAT MATERIAL HAS BEEN USED AND ITS COMPLIANCE WITH THE CODE MUST BE SUBMITTED TO THE BUILDING INSPECTOR.
- AEROSOL ADHESIVES, AND SMALLER UNIT SIZES OF ADHESIVES, AND SEALANT OR CAULKING COMPOUNDS (IN UNITS OF PRODUCT, LESS PACKAGING, WHICH DO NOT WEIGH MORE THAN ONE POUND AND DO NOT CONSIST OF MORE THAN 16 FLUID OUNCES) SHALL COMPLY WITH STATEWIDE VOC STANDARDS AND OTHER REQUIREMENTS, INCLUDING PROHIBITIONS ON USE OF CERTAIN TOXIC COMPOUNDS, OF CALIFORNIA CODE OF REGULATION, TITLE 17, COMMENCING WITH SECTION 94507.
- ARCHITECTURAL PAINTS AND COATINGS SHALL COMPLY WITH TABLE 5.504.4.2 UNLESS MORE STRINGENT LOCAL LIMITS APPLY (SECTION 5.504.3 OF CALGREEN)
- AEROSOL PAINTS AND COATINGS, AEROSOL PAINTS AND COATINGS SHALL MEET THE PRODUCT-WEIGHTED MIR LIMITS FOR ROC IN SECTION 94522(a)(3) AND OTHER REQUIREMENTS, INCLUDING PROHIBITIONS ON USE OF CERTAIN TOXIC COMPOUNDS AND OZONE DEPLETING SUBSTANCES (CCR, TITLE 17, SECTION 94520 et seq. (SECTION 5.504.4.3.1 OF CALGREEN)
- A LETTER FROM THE CONTRACTOR AND OR THE BUILDING OWNER CERTIFYING WHAT PAINT HAS BEEN USED AND ITS COMPLIANCE WITH THE CODE MUST BE SUBMITTED TO THE BUILDING INSPECTOR.
- ALL CARPET INSTALLED IN THE BUILDING INTERIOR SHALL MEET AT LEAST ONE OF THE FOLLOWING TESTING AND PRODUCT REQUIREMENTS WHICH ARE LISTED IN SECTION 5.504.4.4 OF CALGREEN.
 - CARPET AND RUG INSTITUTES' GREEN LABEL PLUS PROGRAM.
 - COMPLIANT WITH THE VOC-EMISSION LIMITS AND TESTING REQUIREMENTS SPECIFIED IN THE CALIFORNIA DEPARTMENTS OF PUBLIC HEALTH STANDARD METHOD FOR TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS, VERSION 1.1, FEBRUARY 2010 (ALSO KNOWN AS CDPH STANDARD METHOD V1.1 OR SPECIFICATION 01350)
 - NSF/ANSI 140 AT THE GOLD LEVEL OR HIGHER.
 - SCIENTIFIC CERTIFICATION SYSTEMS SUSTAINABLE CHOICE
 - COMPLIANCE WITH THE CALIFORNIA COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS (CA-CHIPS) CRITERIA INTERPRETATION FOR EQ 2.2 DATED JULY 2012 AND LISTED IN THE CHPS HIGH PERFORMANCE PRODUCT DATABASE.
- ALL CARPET CUSHION INSTALLED IN THE BUILDING INTERIOR SHALL MEET THE REQUIREMENTS OF THE CARPET AND RUG INSTITUTE GREEN LABEL PROGRAM. ALL CARPET ADHESIVE SHALL MEET THE REQUIREMENTS OF TABLE 804.4.1. A LETTER FROM THE INSTALLER CERTIFYING COMPLIANCE MUST BE SUBMITTED TO THE BUILDING INSPECTOR.
- AT LEAST 80% OF THE FLOOR AREA RECEIVING RESILIENT FLOORING SHALL MEET ONE OF THE FOLLOWING CRITERIA:
 - CERTIFIED UNDER THE RESILIENT FLOOR COVERING INSTITUTE (RFCI) FLOORSCORE PROGRAM.
 - COMPLIANT WITH THE VOC-EMISSION LIMITS AND TESTING REQUIREMENTS SPECIFIED IN THE CALIFORNIA DEPARTMENT OF PUBLIC HEALTH'S 2010 STANDARD METHOD FOR THE TESTING AND EVALUATION CHAMBERS, VERSION 1.1, FEBRUARY 2010.
 - COMPLIANT WITH THE CALIFORNIA COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS (CA-CHIPS) CRITERIA INTERPRETATION FOR EQ 2.2 DATED JULY 2012 AND LISTED IN THE CHPS HIGH PERFORMANCE PRODUCT DATABASE.
 - COMPLIANT WITH CDPH CRITERIA AS CERTIFIED UNDER THE GREENGUARD CHILDREN'S & SCHOOL PROGRAM

DEFERRED APPROVALS

- STANDBY GENERATOR

PLANS FOR THE DEFERRED SUBMITTAL ITEMS SHALL BE SUBMITTED IN A TIMELY MANNER BUT NOT LESS THAN 30 BUSINESS DAYS PRIOR TO INSTALLATION. ALL DOCUMENTS RELATED TO THE DEFERRED SUBMITTAL MUST BE ADDRESSED TO THE SATISFACTION OF THE PLAN CHECK DIVISION PRIOR TO APPROVAL OF THE SUBMITTAL ITEMS.


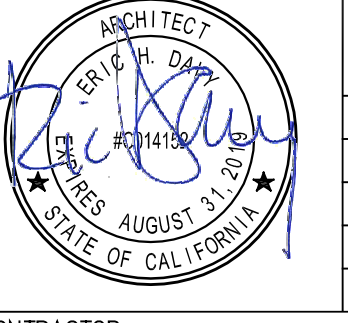
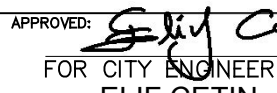
IT IS UNDERSTOOD THAT PLANS FOR THE PROJECT HAVE, AT THIS TIME, BEEN REVIEWED FOR COMPLIANCE WITH ALL APPLICABLE STATE AND CITY REGULATIONS, AND THAT THE PROJECT AS A WHOLE HAS BEEN APPROVED BY THE CITY, WITH THE EXCEPTION OF THE DEFERRED ITEMS LISTED.

I/WE UNDERSTAND THAT I/ WE WILL NOT BE AUTHORIZED ANY INSPECTION OF THE DEFERRED ITEMS PROPOSED PRIOR TO THE SUBMITTAL AND APPROVAL OF PLANS/ OR CALCULATIONS FOR THOSE DEFERRED ITEMS.

G1.1

PLANS FOR THE CONSTRUCTION OF FIRE RESCUE - TEMPORARY FACILITY

GENERAL NOTES

CONSULTANT		SCALE NONE	SPEC. NO. 1732	CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 02 OF 24 SHEETS	WBS S-15012
 ALL IDEAS, ARRANGEMENTS AND PLANS INDICATED OR REPRESENTED BY THIS DRAWING ARE OWNED BY, AND THE PROPERTY OF ERIC DAVY ARCHITECTS, APC AND WERE CREATED, EVOLVED AND DEVELOPED FOR THE USE ON AND IN CONNECTION WITH THE SPECIFIED PROJECT. NONE OF SUCH IDEAS, DESIGNS, ARRANGEMENTS OR PLANS SHALL BE USED BY, OR DISCLOSED TO ANY PERSON, FIRM OR CORPORATION FOR ANY PURPOSE WHATSOEVER WITHOUT THE WRITTEN PERMISSION OF ERIC DAVY ARCHITECTS, APC. WRITTEN DIMENSIONS ON THESE DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AND CONDITIONS ON THE JOB, AND THIS OFFICE MUST BE NOTIFIED OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN BY THESE DRAWINGS.		 ARCHITECT ELIF CETIN STATE OF CALIFORNIA AUGUST 31, 2011		APPROVED:  FOR CITY ENGINEER ELIF CETIN PRINT DCE NAME RCE# DATE 5/9/2018 C60990	SUBMITTED BY: JIHAD SLEIMAN PROJECT MANAGER CHECKED BY: JAMES BOTICA PROJECT ENGINEER
PERMIT SET	DATE 04/06/18	FILED	DATE 04/06/18	238-1728 CCS27 COORDINATE	236-1728 CCS27 COORDINATE
CONTRACTOR INSPECTOR	DATE STARTED	DATE COMPLETED	39665-02-D		

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

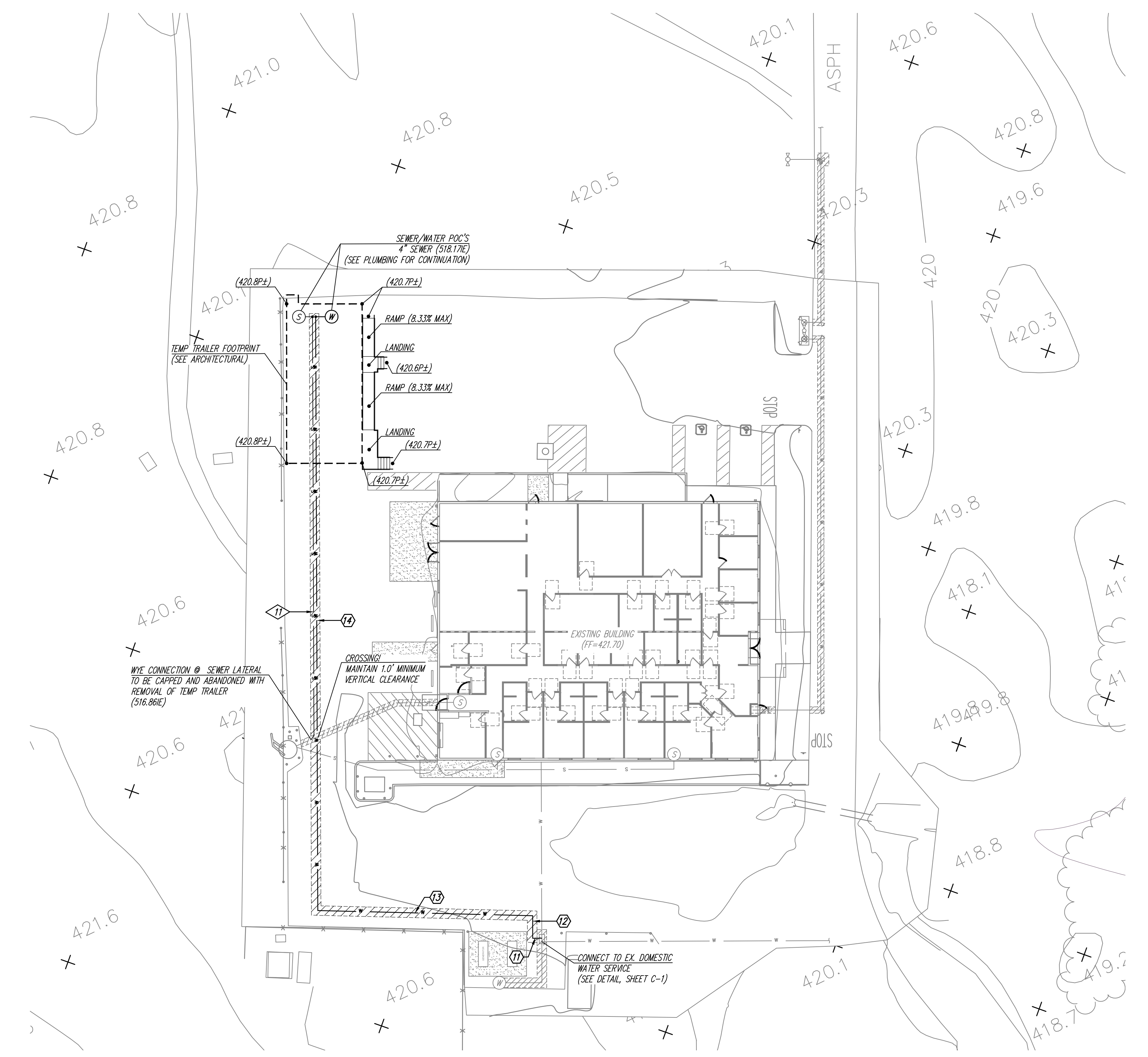
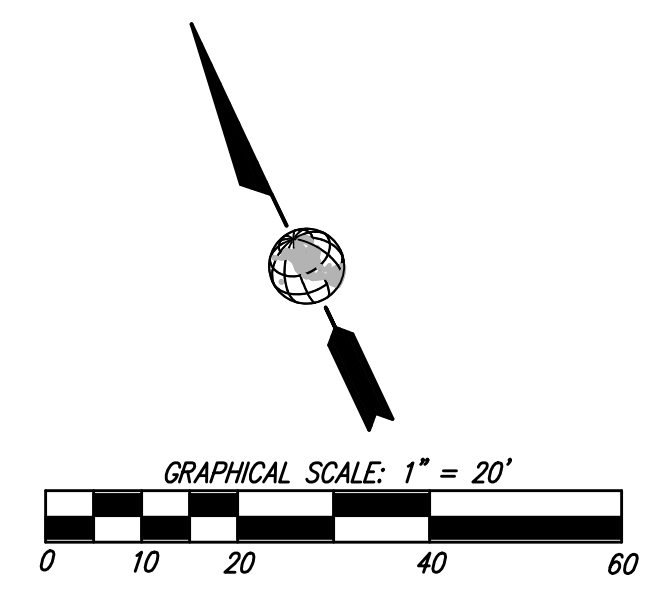
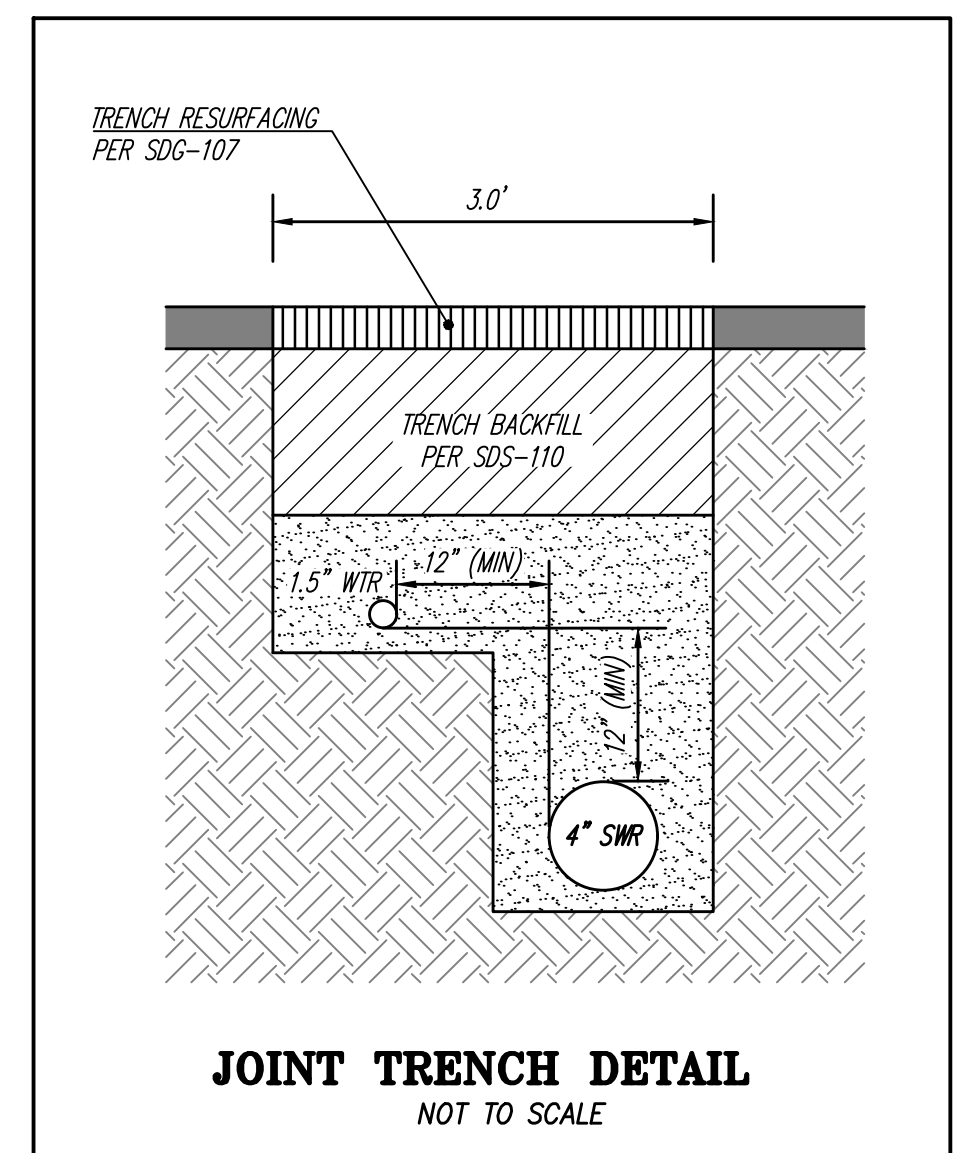
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The City of
SAN DIEGO Public Works

WATER LINE DATA TABLE			
NO.	BEARING	LENGTH	DESCRIPTION:
11	N 64°52'00" W	2.84'	1.5" SCHEDULE 40 PVC
12	N 25°08'00" E	7.06'	1.5" SCHEDULE 40 PVC
13	N 63°17'48" W	67.41'	1.5" SCHEDULE 40 PVC
14	N 25°08'00" E	186.19'	1.5" SCHEDULE 40 PVC

- WATER LINE NOTES:**
- SEE JOINT TRENCH DETAIL (THIS SHEET).
 - DOMESTIC WATER LINES SHALL MAINTAIN 2.0' MINIMUM COVER

SEWER LINE DATA TABLE			
NO.	BEARING	LENGTH	DESCRIPTION:
11	N 25°08'00" E	131.37'	4" PVC SDR-35 @ 1.0%



C-3

PLANS FOR THE CONSTRUCTION OF
FIRE RESCUE AIR OPS FACILITY
TEMPORARY TRAILER PLAN

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

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CONSULTANT

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1053 TENTH AVENUE
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OMEGA ENGINEERING CONSULTANTS
4340 VIEHWEG AVENUE, SUITE B
SAN DIEGO, CALIFORNIA 92123
PHONE: 858.634.8620

SPEC. NO. 1732

CONTRACTOR INSPECTOR

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 03 OF 21 SHEETS

APPROVED: *[Signature]* DATE: 5/9/2018
FOR CITY ENGINEER: ELIF CETIN
PRINT DCE NAME: RCE# C60990

DESCRIPTION	BY	APPROVED	DATE	FILMED

DATE STARTED: _____ DATE COMPLETED: _____

WBS S-15012

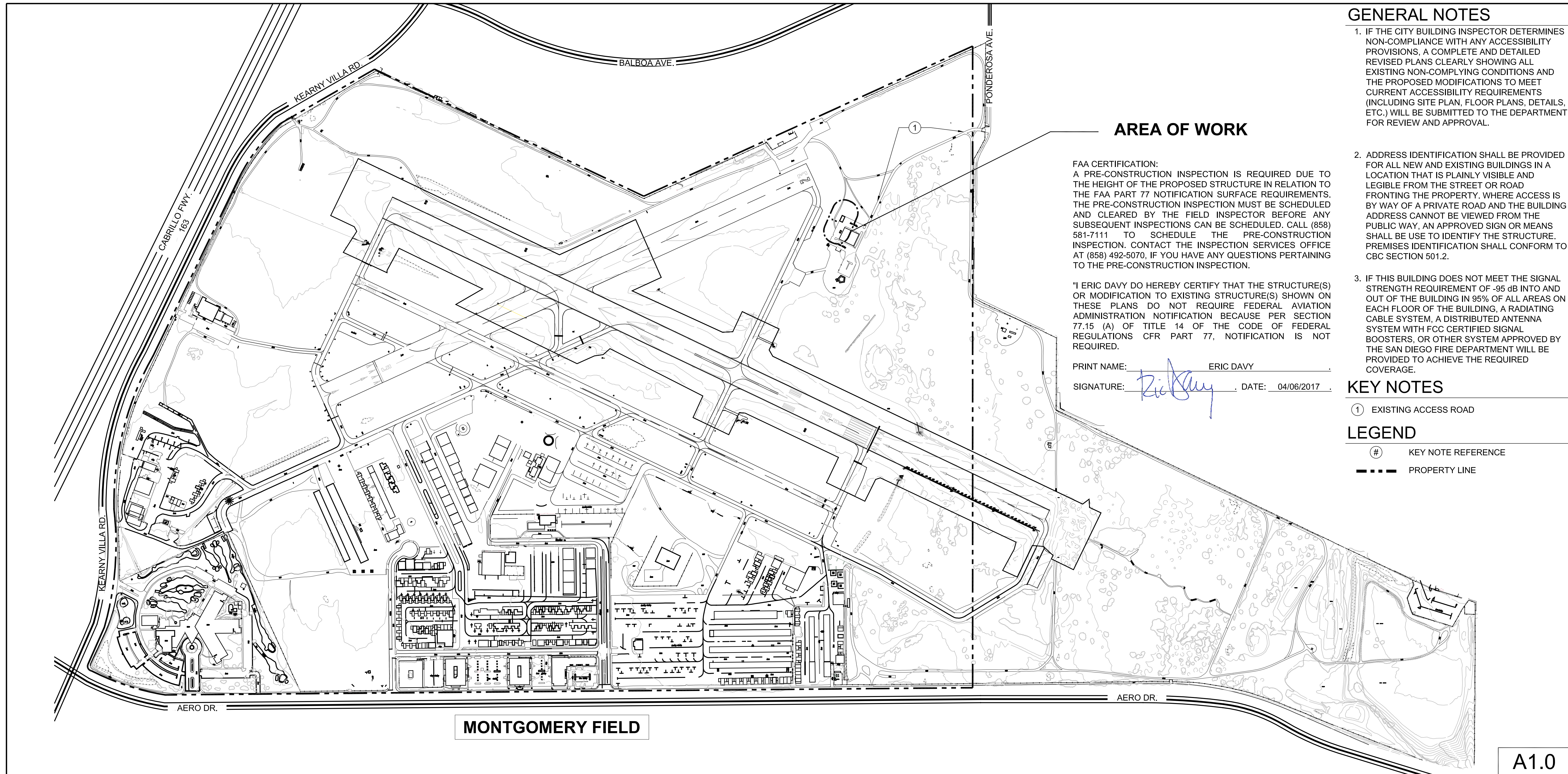
SUBMITTED BY: JIHAD SLEIMAN
PROJECT MANAGER

CHECKED BY: JAMES BOTICA
PROJECT ENGINEER

238-1728
CCS27 COORDINATE

236-1728
CCS27 COORDINATE

39665-03-D



AREA OF WORK

FAA CERTIFICATION:
 A PRE-CONSTRUCTION INSPECTION IS REQUIRED DUE TO THE HEIGHT OF THE PROPOSED STRUCTURE IN RELATION TO THE FAA PART 77 NOTIFICATION SURFACE REQUIREMENTS. THE PRE-CONSTRUCTION INSPECTION MUST BE SCHEDULED AND CLEARED BY THE FIELD INSPECTOR BEFORE ANY SUBSEQUENT INSPECTIONS CAN BE SCHEDULED. CALL (858) 581-7111 TO SCHEDULE THE PRE-CONSTRUCTION INSPECTION. CONTACT THE INSPECTION SERVICES OFFICE AT (858) 492-5070, IF YOU HAVE ANY QUESTIONS PERTAINING TO THE PRE-CONSTRUCTION INSPECTION.

"I ERIC DAVY DO HEREBY CERTIFY THAT THE STRUCTURE(S) OR MODIFICATION TO EXISTING STRUCTURE(S) SHOWN ON THESE PLANS DO NOT REQUIRE FEDERAL AVIATION ADMINISTRATION NOTIFICATION BECAUSE PER SECTION 77.15 (A) OF TITLE 14 OF THE CODE OF FEDERAL REGULATIONS CFR PART 77, NOTIFICATION IS NOT REQUIRED.

PRINT NAME: ERIC DAVY
 SIGNATURE: *Eric Davy* DATE: 04/06/2017

GENERAL NOTES

- IF THE CITY BUILDING INSPECTOR DETERMINES NON-COMPLIANCE WITH ANY ACCESSIBILITY PROVISIONS, A COMPLETE AND DETAILED REVISED PLANS CLEARLY SHOWING ALL EXISTING NON-COMPLYING CONDITIONS AND THE PROPOSED MODIFICATIONS TO MEET CURRENT ACCESSIBILITY REQUIREMENTS (INCLUDING SITE PLAN, FLOOR PLANS, DETAILS, ETC.) WILL BE SUBMITTED TO THE DEPARTMENT FOR REVIEW AND APPROVAL.
- ADDRESS IDENTIFICATION SHALL BE PROVIDED FOR ALL NEW AND EXISTING BUILDINGS IN A LOCATION THAT IS PLAINLY VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY. WHERE ACCESS IS BY WAY OF A PRIVATE ROAD AND THE BUILDING ADDRESS CANNOT BE VIEWED FROM THE PUBLIC WAY, AN APPROVED SIGN OR MEANS SHALL BE USE TO IDENTIFY THE STRUCTURE. PREMISES IDENTIFICATION SHALL CONFORM TO CBC SECTION 501.2.
- IF THIS BUILDING DOES NOT MEET THE SIGNAL STRENGTH REQUIREMENT OF -95 dB INTO AND OUT OF THE BUILDING IN 95% OF ALL AREAS ON EACH FLOOR OF THE BUILDING, A RADIATING CABLE SYSTEM, A DISTRIBUTED ANTENNA SYSTEM WITH FCC CERTIFIED SIGNAL BOOSTERS, OR OTHER SYSTEM APPROVED BY THE SAN DIEGO FIRE DEPARTMENT WILL BE PROVIDED TO ACHIEVE THE REQUIRED COVERAGE.

KEY NOTES

- ① EXISTING ACCESS ROAD

LEGEND

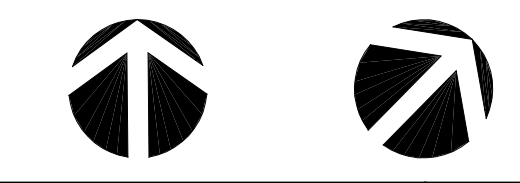
- # KEY NOTE REFERENCE
- PROPERTY LINE

MONTGOMERY FIELD

A1.0

PLOT PLAN

TRUE NORTH PLAN NORTH



①

PLANS FOR THE CONSTRUCTION OF FIRE RESCUE - TEMPORARY FACILITY

PLOT PLAN

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
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ARCHITECT
 ERIC DAVY
 APR 21 2018
 STATE OF CALIFORNIA

CONTRACTOR INSPECTOR

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 04 OF 21 SHEETS		WBS S-15012
APPROVED: <i>Elif Cetin</i>	DATE: 5/9/2018	SUBMITTED BY: JIHAD SLEIMAN
FOR CITY ENGINEER: ELIF CETIN	DATE: C60990	PROJECT MANAGER
PRINT DCE NAME: PERMIT SET	RCE#	CHECKED BY: JAMES BOTICA
DESCRIPTION	BY	APPROVED
DATE	FILED	DATE
04/06/18		
238-1728	CCS27 COORDINATE	
236-1728	CCS27 COORDINATE	
39665-04-D		

GENERAL:

- 1. ALL MATERIALS, WORKMANSHIP, DESIGN AND CONSTRUCTION SHALL CONFORM TO MINIMUM STANDARDS OF THE 2016 EDITION OF THE CALIFORNIA BUILDING CODE (CBC) AND ANY OTHER REGULATORY AGENCIES WHO MAY HAVE AUTHORITY OVER ANY PORTION OF THE WORK.

CONCRETE:

- 1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH IN 28 DAYS OF 3,000 PSI WITH ASTM C150 TYPE II PORTLAND CEMENT, LOW ALKALI.

STATEMENT OF SPECIAL INSPECTIONS:

- 1. WHERE CONTINUOUS SPECIAL INSPECTION IS REQUIRED, THE SPECIAL INSPECTOR SHALL CONTINUOUSLY PROVIDE FULL-TIME VERIFICATION OF THE WORK.

STRUCTURAL DESIGN CRITERIA:

- 1. LOADS: DEAD LOADS = D.L. LIVE LOAD = L.L. ROOF (FLAT) D.L. 14.0 PSF L.L. 20.0 PSF

SUMMARY OF SPECIAL INSPECTIONS TABLE with columns: DESCRIPTION OF TYPE OF INSPECTION REQUIRED, LOCATION, REMARKS, ETC. and DESIGN STRENGTHS.

TABLE 1105.3 REQUIRED SPECIAL INSPECTION AND TEST OF CONCRETE CONSTRUCTION with columns: TYPE, CONTINUOUS, PERIODIC.

STATEMENT OF SPECIAL INSPECTIONS NOTES:

- A. THE CONSTRUCTION INSPECTIONS LISTED ARE IN ADDITION TO THE CALLED INSPECTIONS REQUIRED BY CBC. THE SPECIAL INSPECTIONS IDENTIFIED ON PLANS ARE, IN ADDITION TO, AND NOT A SUBSTITUTE FOR, THOSE INSPECTIONS REQUIRED TO BE PERFORMED BY A CITY'S BUILDING INSPECTOR.

FOUNDATION:

- 1. CHARACTER OF FOUNDATION SOIL: ASSUME CODE MINIMUMS, SEE 2016 CBC TABLE B06.2.

STATEMENT OF CONTRACTOR RESPONSIBILITY:

EACH CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION OF A MAIN WIND- OR SEISMIC-FORCE-RESISTING SYSTEM, DESIGNATED SEISMIC SYSTEM OR A WIND- OR SEISMIC-RESISTING COMPONENT LISTED IN THE STATEMENT OF SPECIAL INSPECTIONS SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE BUILDING OFFICIAL AND THE OWNER PRIOR TO THE COMMENCEMENT OF WORK ON THE SYSTEM OR COMPONENT.

NOTICE TO THE APPLICANT / OWNER / OWNER'S AGENT / ARCHITECT OR ENGINEER OF RECORD:

- 1. BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION / INSTALLATION OF THE WORK SPECIFIED HEREIN, YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF THE CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND, AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.

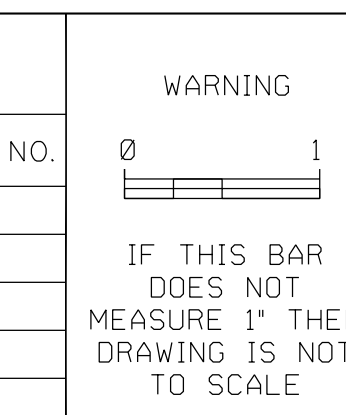
NOTICE TO THE CONTRACTOR / BUILDER / SUB-CONTRACTOR / OWNER-BUILDER:

- 1. BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION / INSTALLATION OF THE WORK SPECIFIED HEREIN, YOU ACKNOWLEDGE AND ARE AWARE OF THE REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS, YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF THE CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATION, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND, AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.

POST INSTALLED ANCHORS table with columns: CONCRETE ANCHORS, ICC REPORT NUMBER.

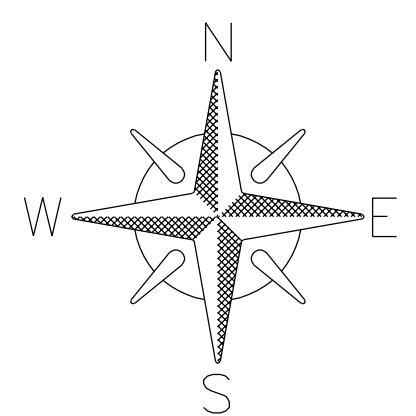
- 3. WHEN INSTALLING DRILLED-IN ANCHORS AND/OR POWER DRIVEN PINS IN EXISTING NON-PRESTRESSED REINFORCED CONCRETE, USE CARE AND CAUTION TO AVOID CUTTING OR DAMAGING THE EXISTING REINFORCING BARS.

CONSTRUCTION CHANGE / ADDENDUM table with columns: CHANGE, DATE, AFFECTED OR ADDED SHEET NUMBERS, APPROVAL NO.

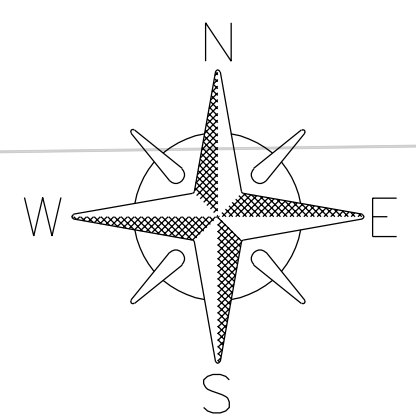
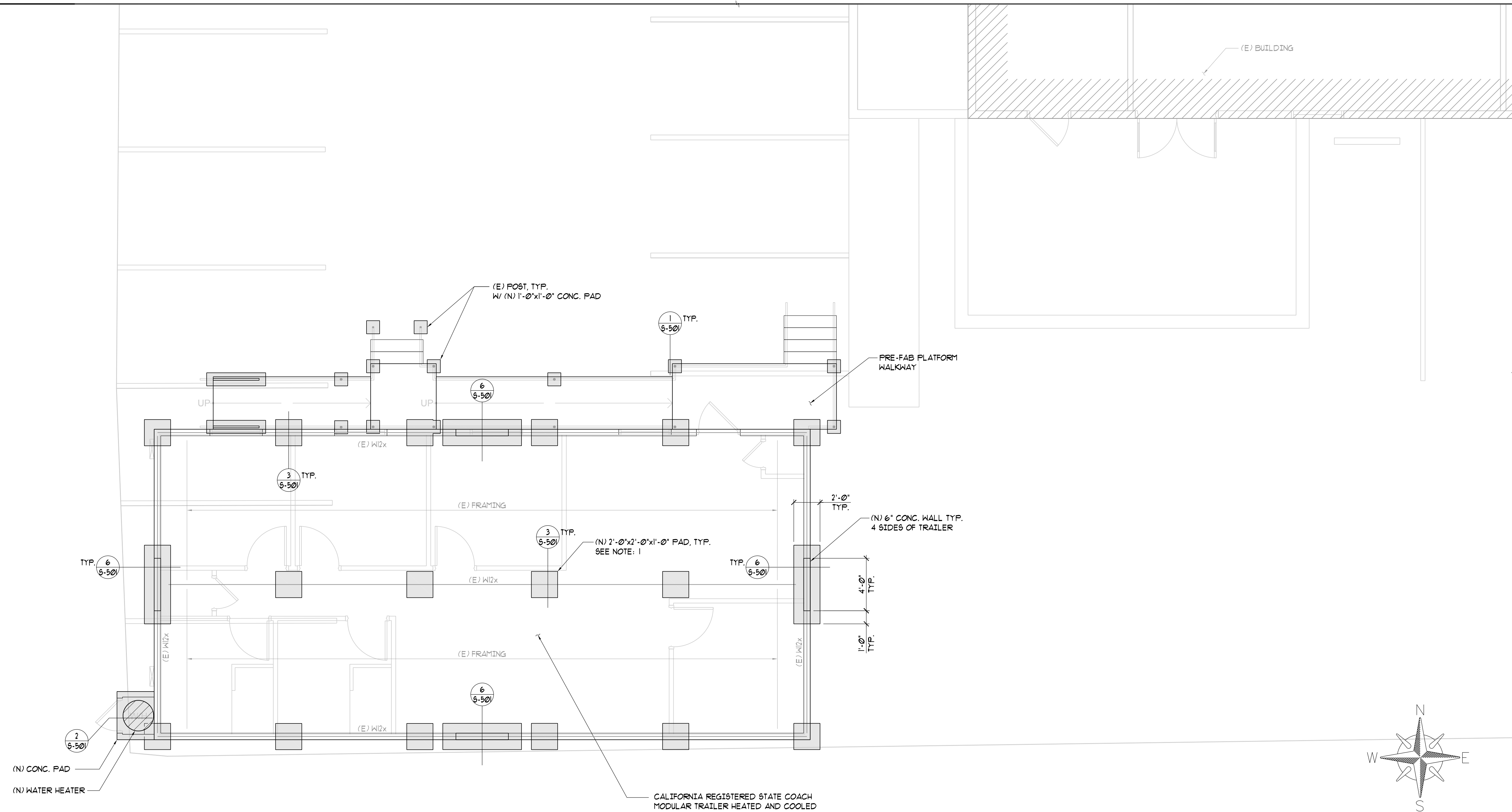


CONSULTANT logos for DAVY ARCHITECTURE and GSSI Structural Engineers.

PERMIT SET information including CITY OF SAN DIEGO, CALIFORNIA, PUBLIC WORKS DEPARTMENT, SHEET 06 OF 24 SHEETS, and project details.



S-001



S-111

MODULAR TRAILER - FOUNDATION PLAN

NOTE:
 1. STEEL PIER STANDS TO BE SPACED @ 10'-0" O.C. MAX. MANUFACTURER TO VERIFY/CONFIRM.

SCALE: 1/4"=1'-0"

**PLANS FOR THE CONSTRUCTION OF
 FIRE RESCUE - TEMPORARY FACILITY
 MODULAR TRAILER - FOUNDATION PLAN**

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

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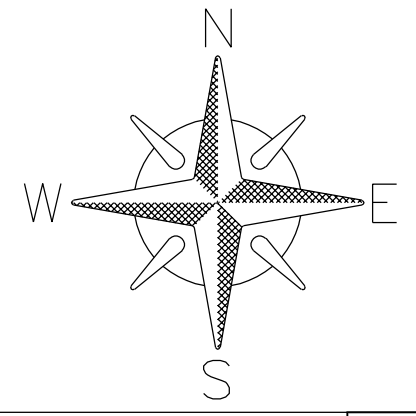
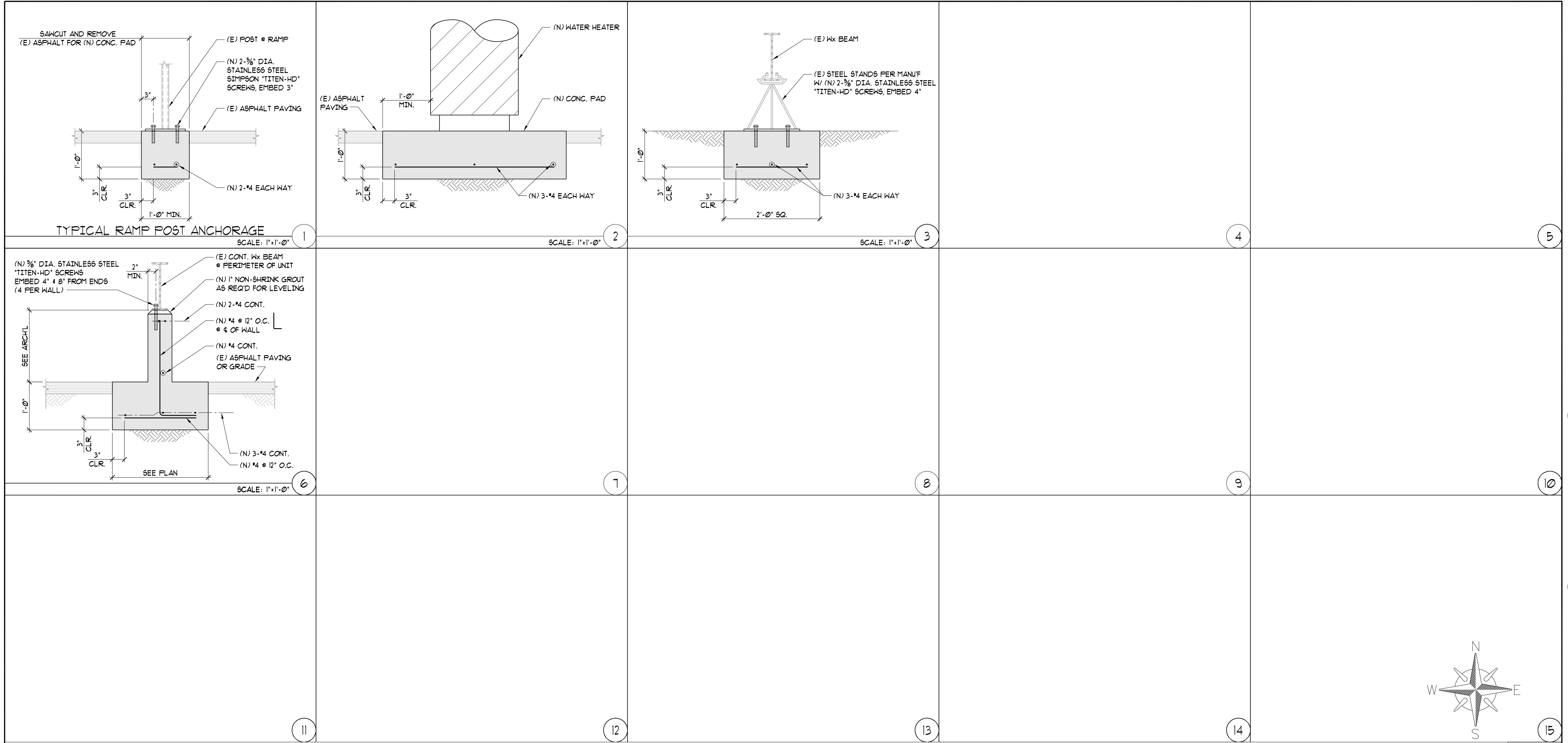
1053 TENTH AVENUE
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3969 First Avenue, Suite 200
 San Diego, California 92103
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 Fax: (619) 687-3814

SPEC. NO. 1732

CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 07 OF 24 SHEETS		WBS S-15012
APPROVED:	DATE: 5/9/2018	SUBMITTED BY: JIHAD SLEIMAN
FOR CITY ENGINEER: ELIF CETIN	DATE: C60990	PROJECT MANAGER
PRINT DCE NAME	RCE#	CHECKED BY: JAMES BOTICA
DESCRIPTION	BY	PROJECT ENGINEER
PERMIT SET	OOG	238-1728 CCS27 COORDINATE
		236-1728 CCS27 COORDINATE
		39665-07-D

CONTRACTOR	DATE STARTED
INSPECTOR	DATE COMPLETED



S-501

PLANS FOR THE CONSTRUCTION OF
FIRE RESCUE - TEMPORARY FACILITY
TYPICAL DETAILS

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

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Fax: (619) 687-3814

SPEC. NO. 1732

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 08 OF 24 SHEETS

APPROVED: *[Signature]* DATE 5/9/2018
FOR CITY ENGINEER ELIF CETIN DATE C60990
PRINTED NAME RCE*

DESCRIPTION	BY	APPROVED	DATE	FILMED
PERMIT SET	OOG			

CONTRACTOR INSPECTOR _____ DATE STARTED _____ DATE COMPLETED _____

WBS S-15012

SUBMITTED BY: JIHAD SLEIMAN PROJECT MANAGER
CHECKED BY: JAMES BOTICA PROJECT ENGINEER
238-1728 CCS27 COORDINATE
236-1728 CCS27 COORDINATE
39665-08-D

PLAN CHECK NOTES (CONT.)

CROSS CONNECTION PROTECTION

A. CROSS CONNECTION PROTECTION SHALL BE PROVIDED AT ALL POTABLE WATER SUPPLIED APPLIANCES AND EQUIPMENT.

PLUMBING SANITARY SEWER CONNECTIONS

A. EACH FIXTURE TRAP SHALL HAVE A PROTECTING VENT SO LOCATED THAT THE DEVELOPED LENGTH OF THE TRAP ARM FROM THE TRAP WEIR TO THE INNER EDGE OF THE VENT SHALL BE WITHIN THE DISTANCE GIVEN IN TABLE 1002.2 C.P.C. BUT IN NO CASE LESS THAN TWO TIMES THE DIAMETER OF THE TRAP ARM.

B. EACH PLUMBING FIXTURE THAT CONNECTS TO THE SANITARY SEWER SYSTEM SHALL BE PROPERLY TRAPPED AND VENTED IN ACCORDANCE WITH THE 2013 CALIFORNIA PLUMBING CODE.

FIRE SPRINKLER

1. WATER METERS FOR COMBINED DOMESTIC WATER AND FIRE SPRINKLER SYSTEMS SHALL NOT BE INSTALLED UNTIL THE FIRE SPRINKLER SYSTEM HAS BEEN SUBMITTED AND APPROVED BY THE BUILDING OFFICIAL.

2. AFTER THE BUILDING PERMIT HAS BEEN ISSUED, THE OWNER SHALL BE RESPONSIBLE FOR ANY COSTS INCURRED AS A RESULT OF CHANGES TO THE DESIGN OF THE FIRE SPRINKLER SYSTEM WHICH PRODUCE A HIGHER GPM AND A LARGER METER SIZE REQUIREMENT.

GRAY WATER NOTES

1. ALL NEW RESIDENTIAL BUILDINGS (SINGLE FAMILY, DUPLEXES OR TOWN HOMES) SHALL BE CONSTRUCTED TO INCLUDE WASTE PIPING TO DISCHARGE GRAY WATER FROM CLOTHES WASHERS TO A PLACE WHERE IT MAY BE USED FOR OUTDOOR IRRIGATION, IN COMPLIANCE WITH SECTION 1602 CPC.

OWNER SIGNATURE: _____

ADA CRITERIA

1. THE HEIGHT OF ACCESSIBLE WATER CLOSETS SHALL BE MINIMUM OF 17 INCHES AND A MAXIMUM OF 19 INCHES MEASURED TO THE TOP OF THE TOILET SEAT. CONTROLS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. CONTROLS FOR FLUSH VALVES SHALL BE MOUNTED ON THE WIDE SIDE OF THE TOILET AREAS, NO MORE THAN 44 INCHES ABOVE THE FLOOR. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 LBS.

2. FLUSH CONTROLS SHALL BE HAND OPERATED AND SHALL BE MOUNTED NO MORE THAN 44 INCHES ABOVE FLOOR.

3. HOT WATER AND DRAIN PIPES UNDER LAVATORIES SHALL BE INSULATED OR OTHERWISE COVERED. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES.

4. FAUCET CONTROLS AND OPERATING MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 LBS.

5. LAVATORIES SHALL BE MOUNTED WITH A CLEARANCE OF AT LEAST 29 INCHES FROM THE FLOOR TO THE BOTTOM OF THE APRON WITH KNEE CLEARANCE UNDER THE FRONT LIP EXTENDING A MINIMUM OF 30 INCHES WIDTH WITH 8 INCHES MINIMUM DEPTH AT THE TOP. TOE CLEARANCE SHALL BE THE SAME WIDTH AND SHALL BE A MINIMUM OF 9 INCHES HIGH FROM THE FLOOR AND A MINIMUM OF 17 INCHES DEEP FROM THE FRONT OF THE LAVATORY. A MAXIMUM OF 34" FROM FINISHED FLOOR TO FLOOD RIM LEVEL OF FIXTURE.

PLUMBING PLAN CHECK NOTES

1A. CALIFORNIA MECHANICAL CODE 2013 (CMC 2013), CALIFORNIA PLUMBING CODE 2013 (CPC 2013) AND 2013 TITLE 24 ENERGY STANDARDS ARE THE CURRENT CODES/STANDARDS THAT ARE APPLICABLE TO THIS PROJECT.

ENERGY CONSERVATION (PLUMBING)

A. ALL WATER HEATERS SHALL BE LISTED IN THE CALIFORNIA ENERGY COMMISSION LIST OF APPROVED WATER HEATERS.

B. ALL PLUMBING FIXTURES, FAUCETS AND SHOWER HEADS SHALL COMPLY WITH CGBC MAXIMUM FLOW REQUIREMENTS PER MINUTE. (2.2 GPM FOR FAUCETS) (2.0 GPM FOR SHOWER HEADS) (1.28 GPF FOR WATER CLOSETS) (0.5 GPF FOR URINALS) LAVATORY FAUCETS IN RESTROOMS SHALL BE THE SELF CLOSING TYPE AND SHALL NOT EXCEED 0.20 GALLONS/CYCLE. EACH KITCHEN FAUCET SHALL NOT EXCEED A WATER FLOW OF 1.8 GPM.

1. PLUMBING LABEL SHALL COMPLY WITH ALL THE REQUIREMENTS IN SECTION 5.303 IN THE 2013 CALIFORNIA GREEN BUILDING CODE.

2. SHOWERS AND TUB-SHOWER COMBINATIONS SHALL BE PROVIDED WITH MIXING VALVES PER SECTION 408.3 CPC.

C. ALL SERVICE HOT WATER PIPING SHALL BE INSULATED IN ACCORDANCE WITH SECTIONS 118, 123 & 124 OF THE 2010 CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS AND TABLE 6.d OF THE 2013 C.M.C.

D. A MAINTENANCE LABEL SHALL BE AFFIXED TO ALL EQUIP- MENT AND A MAINTENANCE MANUAL SHALL BE PROVIDED FOR THE OWNER'S USE. THE LABEL SHALL INDICATE ROUTINE MAINTENANCE REQUIRED OR SHALL REFERENCE BY NUMBER WHICH OPERATING MANUALS EXPLAIN MAINTENANCE REQUIREMENTS IN GREATER DETAIL.

E. ALL EQUIPMENT MUST COMPLY WITH THE STATE OF CALIFORNIA B.E.E.S. 2008. HEATERS FOR DOMESTIC HOT WATER AND/OR POOLS SHALL MEET REQUIREMENTS PER LATEST SECTIONS OF THE B.E.E.S. - 2010. COMPLIANCE CERTIFICATES SHALL BE PROVIDED WITH EQUIPMENT SUBMITTALS

F. WATER HEATERS SHALL COMPLY WITH SECTION 608.3 C.P.C. 2013 FOR THERMAL EXPANSION REQUIREMENTS. PROVIDE EXPANSION TANK OR OTHER APPROVED METHOD OF RELIEVING PRESSURE. A MINIMUM DISTANCE OF 4" MUST BE MAINTAINED ABOVE THE CONTROLS WITH THE LOWER SEISMIC STRAPPING OF THE WATER HEATER. WATER HEATER SHALL BE ANCHORED OR STRAPPED TO RESIST HORIZONTAL DISPLACEMENT DUE TO EARTHQUAKE MOTION PER SECTION 507.0 C.P.C.

1. ROUTING AND TERMINATION OF FLUE AND COMBUSTION AIR INTAKE FOR WATER HEATER SHALL COMPLY WITH CH.5, CPC 2013 AND WITH MANUFACTURERS SPECIFICATIONS.

G. NEW OR REPAIRED POTABLE WATER SYSTEMS SHALL BE DISINFECTED PRIOR TO USE ACCORDING TO THE METHOD SET IN SECTION 609.9 OF THE CALIFORNIA PLUMBING CODE.

MATERIALS

A. PLEASE SEE PLUMBING SPECIFICATIONS

B. STATE & HEALTH SAFETY CODE SEC. 17921.9 BANS THE USE OF CHLORINATED POLYVINYL CHLORIDE (CPVC) FOR INTERIOR WATER-SUPPLY PIPING.

C. BUILDING DRAIN AND VENT PIPING SHALL COMPLY WITH SECTIONS 701.0 AND 903.0 OF THE CALIFORNIA PLUMBING CODE.

D. ALL SANITARY SYSTEM MATERIALS SHALL BE LISTED BY AN APPROVED LISTING AGENCY.

HOSE BIBBS

A. ALL HOSE BIBBS SHALL HAVE PERMANENTLY MOUNTED VACUUM BREAKERS.

FLOOR SINKS & FLOOR DRAINS

A. ALL FLOOR SINKS SHALL BE USED FOR A.C. CONDENSATE, P & T RELIEF VALVES AND EQUIPMENT DRAINS ONLY. NO OTHER USES SHALL BE ALLOWED UNLESS APPROVED BY LOCAL BUILDING DEPARTMENT.

B. EACH VENT SHALL RISE VERTICALLY TO A POINT NOT LESS THAN 6" ABOVE THE FLOOD LEVEL RIM OF THE FIXTURE SERVED BEFORE OFFSETTING HORIZONTALLY OR BEFORE BEING CONNECTED TO ANY OTHER VENT.

C. ALL FLOOR DRAINS REQUIRE AUTOMATIC PRIMER, BRASS.

D. ALL FLOOR SINKS MUST HAVE A HOSE BIB MOUNTED ABOVE.

CAL GREEN NOTES

WATER EFFICIENCY AND CONSERVATION

(5.303.1.1) METERS:

1. NEW BUILDING OR ADDITIONS IN EXCESS OF 50,000 SQUARE FEET. SEPARATE SUB-METERS SHALL BE INSTALLED AS FOLLOWS:

A. FOR EACH INDIVIDUAL LEASED, RENTED OR OTHER TENANT SPACE WITHIN THE BUILDING PROJECTED TO CONSUME MORE THAN 100 GAL/DAY, INCLUDING, BUT NOT LIMITED TO, SPACES USED FOR LAUNDRY OR CLEANERS, RESTAURANT OR FOOD SERVICE, MEDICAL OR DENTAL OFFICE, LABORATORY, BEAUTY SALON OR BARBER SHOP.

B. WHERE SEPARATE SUB-METERS FOR INDIVIDUAL TENANTS ARE UNFEASIBLE, FOR WATER SUPPLIED TO THE FOLLOWING SUB SYSTEMS:

1. MAKEUP WATER FOR COOLING TOWERS WHERE FLOW THROUGH IS GREATER THAN 500 GPM (30 L/s).

2. MAKE-UP WATER FOR EVAPORATIVE COOLERS GREATER THAN 6 GPM (0.04 L/S).

3. STEAM AND HOT-WATER BOILERS WITH ENERGY INPUT MORE THAN 500,000 BTUH (147 kW).

(5.303.1.2) EXCESS CONSUMPTION:

1. A SEPARATE SUB-METER OR METERING DEVICE SHALL BE PROVIDED FOR ANY TENANT WITHIN A NEW BUILDING OR AN ADDITION THAT IS PROJECTED TO CONSUME MORE THAN 1,000 GAL/DAY (3,800 L/DAY).

(5.303.3) WATER CONSERVING PLUMBING FIXTURES AND FITTINGS:

1. PLUMBING FIXTURES (WATER CLOSETS AND URINALS) AND FITTINGS (FAUCETS AND SHOWER HEADS) SHALL COMPLY TO THE FOLLOWING REQUIREMENTS:

A. (5.303.3.1) WATER CLOSET: THE EFFECTIVE FLUSH VOLUME OF ALL WATER CLOSETS SHALL NOT EXCEED 1.28 GALLONS PER FLUSH. TANK-TYPE WATER CLOSETS SHALL BE CERTIFIED TO THE PERFORMANCE OF THE U.S. EPA WATER SENSE SPECIFICATIONS FOR TANK-TYPE TOILETS.

NOTE: THE EFFECTIVE FLUSH VOLUME OF DUAL FLUSH TOILETS IS DEFINED AS THE COMPOSITE, AVERAGE FLUSH VOLUME OF TWO REDUCED FLUSHES AND ONE FULL FLUSH.

B. (5.303.3.2) URINAL: THE EFFECTIVE FLUSH VOLUME OF URINALS SHALL NOT EXCEED 0.5 GALLONS PER FLUSH.

C. 5.303.3.3) SHOWERHEADS: (5.303.3.3.1) SINGLE SHOWERHEAD. SHOWERHEADS SHALL HAVE A MAXIMUM FLOW RATE OF NOT MORE THAN 2.0 GALLONS PER MINUTE AT 80 PSI. SHOWERHEADS SHALL BE CERTIFIED TO THE PERFORMANCE CRITERIA OF THE U.S. EPA WATERSENSE SPECIFICATION FOR SHOWERHEADS.

D. (5.303.3.3.2) MULTIPLE SHOWERHEADS SERVING ONE SHOWER: WHEN A SHOWER IS SERVED BY MORE THAN ONE SHOWERHEAD, THE COMBINED FLOW RATE OF ALL SHOWERHEADS AND /OR OTHER SHOWER OUTLETS CONTROLLED BY A SINGLE VALVE SHALL NOT EXCEED 2.0 GALLONS PER MINUTE AT 80 PSI, OR THE SHOWER SHALL BE DESIGNED TO ALLOW ONLY ONE SHOWER OUTLET TO BE OPERATIONAL AT A TIME.

NOTE: A HAND-HELD SHOWER SHALL BE CONSIDERED A SHOWERHEAD.

(5.303.3.4) FAUCETS AND FOUNTAINS:

A. (5.303.3.4.1) NON-RESIDENTIAL LAVATORY FAUCET: LAVATORY FAUCETS SHALL HAVE A MAXIMUM FLOW RATE OF NOT MORE THAN 0.5 GALLONS PER MINUTE AT 60 PSI.

B. (5.303.3.4.2) KITCHEN FAUCET: KITCHEN FAUCETS SHALL HAVE A MAXIMUM FLOW RATE OF NOT MORE THAN 1.8 GALLONS PER MINUTE AT 60 PSI. KITCHEN FAUCETS MAY TEMPORARILY INCREASE THE FLOW ABOVE THE MAXIMUM RATE, BUT NOT TO EXCEED 2.2 GALLONS PER MINUTE AT 60 PSI, AND MUST DEFAULT TO A MAXIMUM FLOW RATE OF 1.8 GALLONS PER MINUTE.

C. (5.303.3.4.4) METERING FAUCETS: METERING FAUCETS SHALL NOT DELIVER MORE THAN 0.20 GALLONS PER CYCLE.

(5.303.6) STANDARDS FOR PLUMBING FIXTURES AND FITTINGS:

1. PLUMBING FIXTURES AND FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CALIFORNIA PLUMBING CODE, AND SHALL MEET THE APPLICABLE STANDARDS AND REFERENCED IN TABLE 1401.1 OF THE CALIFORNIA PLUMBING CODE AND IN CHAPTER 6 OF THIS CODE.

PIPE MATERIALS SCHEDULE

<u>SANITARY WASTE, STORM DRAIN & VENT LINES:</u> (ABOVE & BELOW GRADE)	SCHEDULE 40 ABS PIPE & FITTINGS WITH SOLVENT WELD JOINTS.
<u>VENT PIPING:</u>	SAME AS SANITARY WASTE - PROVIDE VANDAL PROOF CAP AT ROOF TERMINATION
<u>DOMESTIC COLD & HOT WATER:</u> (ABOVE GRADE)	TYPE "L" HARD DRAWN, COPPER PIPE & FITTINGS WITH LEAD FREE SOLDER JOINTS. (INSULATE HOT WATER PIPING)
(DOMESTIC WATER BELOW GRADE)	TYPE "K" HARD DRAWN COPPER PIPE & FITTINGS WITH SILVER BRAZED JOINTS (INSULATED)
<u>CONDENSATE PIPING:</u> (ABOVE GRADE)	TYPE "M" HARD DRAWN, COPPER PIPE & FITTINGS WITH 95/5 SOLDER JOINTS. (INSULATED)

- ALL PLUMBING FIXTURE HARDWARE SHALL BE STAINLESS STEEL (ALL THREAD, NUTS, BOLTS UNI-STRUT, ETC.) TO COMPLY WITH CITY OF SAN DIEGO STANDARDS.
- ACCESS PANELS SHALL BE STAINLESS STEEL.
- ALL VENT PENETRATIONS SHALL HAVE VANDAL PROOF CAPS ON ROOF.

PLUMBING LEGEND

SYMBOL	ABBR.	DESCRIPTION
---	W./S.	NEW WASTE OR SOIL PIPING BELOW GRADE
---	W./S.	NEW WASTE OR SOIL PIPING ABOVE GRADE.
---	V	VENT PIPING
---	CW	COLD WATER PIPING
---	HW	HOT WATER PIPING
---	HWR	HOT WATER RETURN PIPING
---C---	COND.	CONDENSATE DRAIN PIPING
--- O ---	S.O.V.	SHUT-OFF VALVE
---Z---	CV	CHECK VALVE
---X---	PRV	PRESSURE REDUCING VALVE
---		DIRECTION OF FLOW
---Ø---	FCO	FLOOR CLEANOUT
--- ---	WCO	WALL CLEANOUT
---●---	POC	POINT OF CONNECTION
---J L---	VTR	VENT THRU ROOF
---X---	B.V.	BALANCING VALVE
---R---	WHA	WATER HAMMER ARRESTOR
---TP---	TP	TRAP PRIMER LINE
//////		(E) PIPING TO BE DEMOLISHED

P0.1

PLANS FOR THE CONSTRUCTION OF
FIRE RESCUE AIR OPS FACILITY
PLUMBING LEGEND AND NOTES

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 09 OF 24 SHEETS

WBS S-15012

APPROVED: *[Signature]* 5/9/2018
FOR CITY ENGINEER ELIF CETIN DATE C60990
PRINT DCE NAME RCE#

DESCRIPTION	BY	APPROVED	DATE	FILMED

DESIGNED BY: JIHAD SLEIMAN PROJECT MANAGER
JAMES BOTICA PROJECT ENGINEER
238-1728 CCS27 COORDINATE
236-1728 CCS27 COORDINATE
39665-09-D

CONTRACTOR INSPECTOR _____ DATE STARTED _____ DATE COMPLETED _____

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



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MECHANICAL ENGINEER
STATE OF CALIFORNIA
No. 1072018

CITY OF SAN DIEGO CONSTRUCTION STANDARDS

SECTION 26 – CONDUCTORS

- * ALL WIRING WILL BE STRANDED, COPPER THHN TYPE, INCLUDING ALL #13 A.W. WIRE.
- * MINIMUM WIRING SIZE WILL BE #12 A.W.G. STRANDED.
- * ONE NEUTRAL FOR EVERY ONE CIRCUIT PULLED. NO SHARING ON NEUTRAL WIRES ANYWHERE.

SECTION 26 – GROUNDING

- * ALL RACEWAYS WILL INCLUDE A FULL SIZE GREEN INSULATED GROUND WIRE TERMINATED AT EACH OUTLET BOX, DEVICE ENCLOSURE, ETC. AND CONNECTED BACK AT THE PANEL BOARDS, SWITCHBOARD OR CABINET ON THE APPROPRIATE GROUND BUS.
- * THE GREEN INSULATED GROUND (BOND) WIRE WILL BE SPLICED TOGETHER WITHIN THE OUTLET BOX. A GREEN INSULATED BONDING JUMPER WILL BE PROVIDED FROM THE SPLICE TO THE BOX BODY. ATTACHMENT TO THE BOX BODY WILL BE PROVIDED USING A TAPPED #10-32 X 3/8" SCREW MINIMUM. A GREEN INSULATED BONDING JUMPER WILL BE PROVIDED FROM THE SPLICE TO THE RECEPTACLE GROUND SCREW EVEN WITH SELF-GROUNDING RECEPTACLES.

SECTION 26 – CONDUIT & BOXES

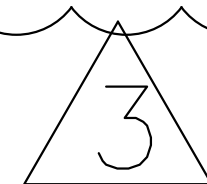
- * ALL WIRING INSIDE THE BUILDING WILL BE IN EMT CONDUIT.
- * ALL EMT CONNECTOR, COUPLING, AND OTHER FITTINGS WILL BE NON-CAST STEEL COMPRESSION TYPE.
- * NO BX OR MC CABLES ALLOWED.
- * FLEXIBLE STEEL CONDUIT IS ALLOWED ONLY ON MOTOR CONNECTION AND FIXTURE TAILS, NOT OVER 6 FEET IN LENGTH.
- * ANY EXPOSED WIRING DEVICE BOX WILL BE CAST IRON ONLY. NO CAST ALUMINUM.
- * ANY EXPOSED LIGHT FIXTURE JUNCTION BOXES WILL BE CAST IRON ONLY. NO CAST ALUMINUM.
- * ALL OUTDOOR OUTLETS WILL BE INSTALLED IN A RECESSED STAINLESS STEEL BOX WITH A FLUSH, LOCKABLE COVER WITH A 20 AMP G.F.C.I. RECEPTACLE AND ON A SEPARATE CIRCUIT. FOR GAZEBOS AND OUTSIDE PUBLIC AREAS.
- * INSIDE WIRING DEVICES BOXES AND JUNCTION BOXES WILL BE AT LEAST 4" SQUARE BY 1 1/8 INCH DEEP.
- * ELECTRICAL, PHONE, AND DATA FLOOR BOXES WILL BE BRASS TYPE (RFB STYLE WALKER) WITH TAMPER-PROOF SCREW CAP ONLY. ALL BRASS COVERS WILL BE FLUSH WITH THE FLOOR. FLOOR MONUMENTS ARE NOT ACCEPTABLE.
- * FLAT WIRING WILL NOT BE USED.

DEVICES AND COVER PLATES

- * WALL SWITCHES – 20 AMP 120V/277V INDUSTRIAL TYPE SPECIFY:
 - A. HUBBELL: HBL 1221 OR EQUAL.
 - B. DECORATOR TYPE: HUBBELL DS 120-20 AMP
- * DUPLEX RECEPTACLE 20 AMP 120V/277V INDUSTRIAL TYPE SPECIFY:
 - A. HUBBELL – (20 AMP) # HBL 5362 OR EQUAL.
 - B. DECORATOR TYPE DR 20DR
- * ALL DEVICES ARE TO HAVE CLAMP STYLE SIDE/BACK CONNECTIONS FOR STRANDED WIRE ONLY. ALL RECEPTACLES SHALL BE PIGTAILED OUT SO ONLY ONE COLOR WIRE, A NEUTRAL WIRE, AND A GROUND WIRE IS CONNECTED TO THE BACK OF THE RECEPTACLES.
- * ALL RECEPTACLES AND SWITCHES ON EMERGENCY POWER WILL BE RED.
- * ALL RECEPTACLES IN PUBLIC AREAS SHALL BE TAMPER-PROOF.
 - A. HUBBELL – HBL 8300SGA
 - B. DECORATOR TYPE DR20TR

SECTION 26 – ID & LABELS

- * PROVIDE NAME PLATES A MINIMUM SIZE OF 1" HIGH AND 3" WIDE BY 3/32" THICK MATTE WHITE (FOR NORMAL POWER) AND RED (FOR EMERGENCY POWER) LAMINATED PHENOLIC NAMEPLATES WITH 1/4" WHITE CHARACTERS ENGRAVED IN THE PLASTIC FOR ALL ITEMS OF ELECTRICAL EQUIPMENT INCLUDING, BUT NOT LIMITED TO SWITCHBOARDS, PANEL BOARDS, AUTOMATIC TRANSFER SWITCHES, MOTOR CONTROL CENTERS, FEEDER CIRCUIT BREAKERS, RELAYS, TIME SWITCHES, DISCONNECT SWITCHES, EXPOSED PULL OR JUNCTION BOXES, AND ALL CONTROL EQUIPMENT. NAME PLATES WILL BE ATTACHED WITH 2 CADMIUM-PLATED SCREWS. ADHESIVE ATTACHMENT WILL NOT BE ACCEPTABLE. PUNCH STRIP TAPE TYPE NAME PLATES WITH CARD HOLDERS IN ANY FORM ARE PROHIBITED.
- * PROVIDE WIRE MARKER ON EACH CONDUCTOR IN ELECTRICAL PANEL PULL BOX, OUTLET, AND JUNCTION BOX. THIS INCLUDES ALL DISCONNECTS AND CONNECTIONS. (IF MORE THAN ONE NEUTRAL CONDUCTOR IS PRESENT, MARK EACH RELATED CIRCUIT AND PANEL NUMBER)
- * LABEL OUTSIDE OF ALL COVER PLATES OF WIRING DEVICES AND JUNCTION BOXES WITH CIRCUIT AND PANEL NUMBER. EACH BRANCH CIRCUIT DEVICE COVER PLATE WILL BE LABELED (ENGRAVED OR SILK SCREEN) TO INDICATE THE BRANCH CIRCUIT AND PANEL NUMBER. DEVICES WILL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING: TOGGLE SWITCHES, DIMMER SWITCHES AND RECEPTACLE.



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ELECTRICAL CITY OF SAN DIEGO STANDARDS

1

3 PLANS FOR THE CONSTRUCTION OF
City of San Diego Construction Standard

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 12 OF 21 SHEETS

WBS _____

APPROVED: *[Signature]* DATE: 5/9/2018
FOR CITY ENGINEER: ELIF CETIN DATE: C60990
PRINT DCE NAME: RCE*

CHECKED BY: JAMES BOTICA
PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
1				
2				
3				
4				

DATE STARTED _____ DATE COMPLETED _____

CONTRACTOR _____ INSPECTOR _____

39665-12-D

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
0 1
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NEDC@PACBELL.NET

SPEC. NO. 1732

PLAT DATE: 9-06-18

ELECTRICAL LEGEND			
	RECESSED MTD. LIGHT FIXTURE	4W	4-WIRE
	HIGH BAY LIGHT FIXTURE	A.A.M.P.S.	AMPERES
	FLUOR. STRIP LIGHT	A.F.F.	ABOVE FINISHED FLOOR
	SURFACE MTD. LIGHT FIXTURE	A.I.C.	AMPERE INTERRUPTING CAPACITY
	RECESSED DOWN LIGHT FIXTURE	B.C.	BARE COPPER
	WALL MTD. LIGHT FIXTURE	C.C.	CONDUIT
	RECESSED PANEL	C.O.	CONDUIT ONLY
	SPST DIMMER SWITCH, +48" TO TOP OF BOX	C/B	CIRCUIT BREAKER
	SPST TOGGLE SWITCH, +48" TO TOP OF BOX	CKT	CIRCUIT
	SPST MANUAL ON 30 MINUTE OCCUPANT MOTION SENSOR SWITCH, +48" TO TOP OF BOX	CONN	CONNECTED
	THREE-WAY SWITCH +48" TO TOP OF BOX U.O.N.	CORR.	CORRIDOR
	CONVENIENCE DUPLEX OUTLET +15" TO BOTTOM OF BOX A.F.F. - U.O.N.	CU	COPPER
	FOURPLEX CONVENIENCE OUTLET +15" TO BOTTOM OF BOX A.F.F. - U.O.N.	ELECT.	ELECTRICAL
	FOURPLEX CONVENIENCE OUTLET HALF SWITCHED +15" TO BOTTOM OF BOX A.F.F. - U.O.N.	EXH/EF	EXHAUST
	FUSED DISCONNECT SWITCH	EXTER.	EXTERIOR FAULT INTERRUPTING
	JUNCTION BOX WITH FLEX CONNECTION	GFI	GROUND FAULT INTERRUPTING
	WALL MTD. TELEPHONE OUTLET +15" TO BOTTOM OF BOX A.F.F.	GND.	GROUND
	WALL MTD. DATA OUTLET +15" TO BOTTOM OF BOX A.F.F.	LTG.	LIGHTING
	NO. OF POLES	LED	LIGHT EMITTING DIODE LIGHTING
	SWITCH SIZE, AMPS FUSE SIZE, AMPS FUSE CLASS TYPE	M.P.	MULTI-PURPOSE
	BRANCH CIRCUIT HOME-RUN WITH PANEL & CIRCUIT DESIGNATION. HASH MARKS INDICATE NO. OF #12 WIRE U.O.N.	M/C	MACHINE
	TELEPHONE SYSTEM CONDUIT WITH PULL-ROPE	MECH.	MECHANICAL
	EMERGENCY SYSTEM CONDUIT & WIRING	MTD.	MOUNTED
	CONDUIT WITH #12 WIRE, EACH TICK INDICATES ONE #12 WIRE.	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
	LIGHT FIXTURE DESIGNATION. SEE LIGHT FIXTURE SCHEDULE.	P	POLE
	TV OUTLET WITH COAX +15" A.F.F. BOTTOM	PH.-	PHASE
	CONVENIENCE DUPLEX OUTLET +15" A.F.F. BOTTOM HALF SWITCHED, HALF HOT.	PNL	PANEL
	SPECIAL PURPOSE RECEPTACLE, SIZE PER PANEL.	RECEP.	RECEPTACLE
	WALL MTD. PLUG MOLD	RM.	ROOM
	DROP CHORD RECEPTACLE	TOIL.	TOILET
	EXHAUST FAN	TYP.	TYPICAL
	SMOKE ALARM, 120V W/ BATTERY BACKUP.	U.O.N.	UNLESS OTHERWISE NOTED
	COMBO PLATE TV OUTLET WITH COAX AND TELEPHONE OUTLET +15" AFF BOTTOM	U/G	UNDER GROUND
		W.WATT	WATTAGE
		W.P.	WEATHERPROOF
		EM	EMERGENCY
		NL	NIGHT LIGHT

- GENERAL NOTES**
- ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY UNDERWRITER'S LABORATORIES AND BEAR THEIR LABEL, OR LISTED AND CERTIFIED BY A NATIONALLY RECOGNIZED TESTING AUTHORITY WHERE UL DOES NOT HAVE A LISTING. CUSTOM MADE EQUIPMENT MUST HAVE COMPLETE TEST DATA SUBMITTED BY THE MANUFACTURER ATTESTING TO ITS SAFETY.
 - THE CONTRACTOR SHALL VISIT THE SITE INCLUDING ALL AREAS INDICATED ON THE DRAWINGS. HE SHALL THOROUGHLY FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS AND BY SUBMITTING A BID ACCEPTS CONDITIONS UNDER WHICH HE SHALL BE REQUIRED TO PERFORM HIS WORK.
 - IT SHALL BE THE ELECTRICAL CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COMPLETE SET OF DRAWINGS AND SPECIFICATIONS. HE SHALL CHECK THE DRAWINGS OF THE OTHER TRADES AND SHALL CAREFULLY READ THE ENTIRE SPECIFICATIONS AND DETERMINE HIS RESPONSIBILITIES. FAILURE TO DO SO SHALL NOT RELEASE THE CONTRACTOR FROM DOING THE WORK IN COMPLETE ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS.
 - THE CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND FEES NECESSARY FOR EXECUTION AND COMPLETION OF ELECTRICAL WORK, INCLUDING ALL CHARGES BY THE LOCAL GOVERNMENT AGENCIES.
 - THE CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES AT THE SITE. ANY COST TO ROUTE CONDUIT OTHER THAN AS SHOWN ON THE PLANS SHALL BE INCURRED BY THE CONTRACTOR.
 - ALL INTERRUPTION OF ELECTRICAL LINES SHALL BE KEPT TO A MINIMUM. HOWEVER, WHEN AN INTERRUPTION IS NECESSARY, THE SHUTDOWN MUST BE COORDINATED WITH THE POWER COMPANY AND THE OWNER.
 - ALL FINAL CONNECTIONS TO OWNER-FURNISHED EQUIPMENT SHALL BE MADE BY THE CONTRACTOR.
 - IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DO ALL CORING, SAW CUTTING, PATCHING, AND REFINISHING OF EXISTING WALLS AND SURFACES WHEREVER IT IS NECESSARY FOR HIM TO PENETRATE FOR HIS WORK. ALL OPENINGS SHALL BE SEALED TO MEET THE FIRE RATINGS OF THE PARTICULAR WALL, FLOOR OR CEILING.
 - WHEREVER A DISCREPANCY EXISTS IN QUANTITY OR SIZE OF CONDUIT, WIRE, EQUIPMENT, DEVICES, CIRCUIT BREAKERS, TRANSFORMERS, ETC. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIALS AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS TO ENSURE COMPLETE AND OPERABLE SYSTEMS AS REQUIRED BY THE OWNER AND THE ARCHITECT.
 - IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE TYPE OF CEILING SYSTEMS AND TO FURNISH APPROVED LIGHTING FIXTURES OF ALL CEILING MOUNTED LIGHTING FIXTURES AND DEVICES SHALL BE AS INDICATED ON THE ARCHITECTURAL REFLECTED CEILING PLANS. ALL OUTLET LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECTURAL ELEVATIONS PRIOR TO ROUGH-IN.
 - ALL ELECTRICAL WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE 2016 CALIFORNIA ELECTRICAL CODE (CEC) AND ALL OTHER LOCAL AND STATE CODES HAVING JURISDICTION.
 - ALL CONDUCTORS SHALL BE COPPER TYPE THHN/THWN MIN. #12.
 - METALLIC WIRING METHODS SHALL BE USED THROUGHOUT THE BUILDING, IE: EMT, METAL FLEX, ETC.

WARNING

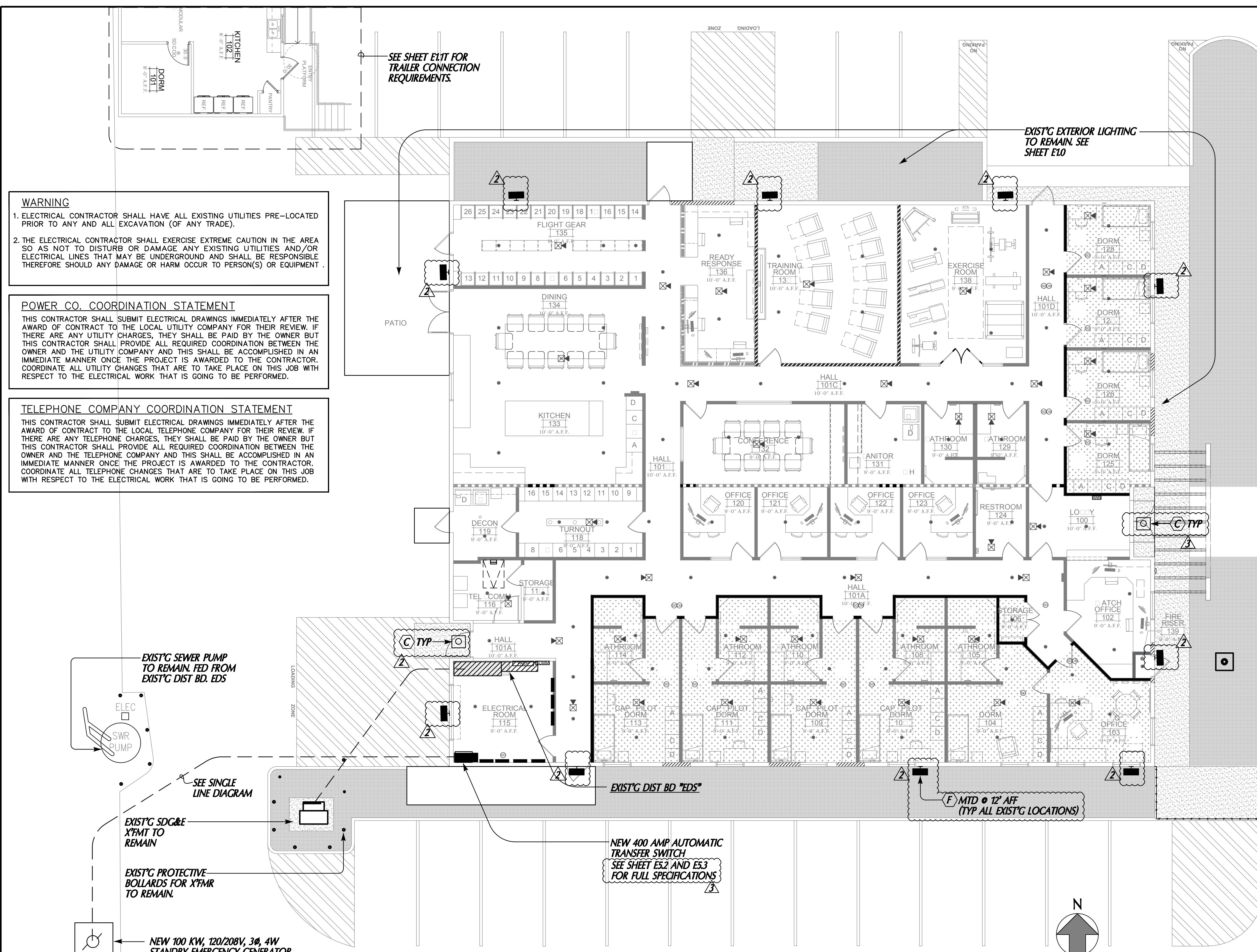
- ELECTRICAL CONTRACTOR SHALL HAVE ALL EXISTING UTILITIES PRE-LOCATED PRIOR TO ANY AND ALL EXCAVATION (OF ANY TRADE).
- THE ELECTRICAL CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN THE AREA SO AS NOT TO DISTURB OR DAMAGE ANY EXISTING UTILITIES AND/OR ELECTRICAL LINES THAT MAY BE UNDERGROUND AND SHALL BE RESPONSIBLE THEREFORE SHOULD ANY DAMAGE OR HARM OCCUR TO PERSON(S) OR EQUIPMENT.

POWER CO. COORDINATION STATEMENT

THIS CONTRACTOR SHALL SUBMIT ELECTRICAL DRAWINGS IMMEDIATELY AFTER THE AWARD OF CONTRACT TO THE LOCAL UTILITY COMPANY FOR THEIR REVIEW. IF THERE ARE ANY UTILITY CHARGES, THEY SHALL BE PAID BY THE OWNER BUT THIS CONTRACTOR SHALL PROVIDE ALL REQUIRED COORDINATION BETWEEN THE OWNER AND THE UTILITY COMPANY AND THIS SHALL BE ACCOMPLISHED IN AN IMMEDIATE MANNER ONCE THE PROJECT IS AWARDED TO THE CONTRACTOR. COORDINATE ALL UTILITY CHANGES THAT ARE TO TAKE PLACE ON THIS JOB WITH RESPECT TO THE ELECTRICAL WORK THAT IS GOING TO BE PERFORMED.

TELEPHONE COMPANY COORDINATION STATEMENT

THIS CONTRACTOR SHALL SUBMIT ELECTRICAL DRAWINGS IMMEDIATELY AFTER THE AWARD OF CONTRACT TO THE LOCAL TELEPHONE COMPANY FOR THEIR REVIEW. IF THERE ARE ANY TELEPHONE CHARGES, THEY SHALL BE PAID BY THE OWNER BUT THIS CONTRACTOR SHALL PROVIDE ALL REQUIRED COORDINATION BETWEEN THE OWNER AND THE TELEPHONE COMPANY AND THIS SHALL BE ACCOMPLISHED IN AN IMMEDIATE MANNER ONCE THE PROJECT IS AWARDED TO THE CONTRACTOR. COORDINATE ALL TELEPHONE CHANGES THAT ARE TO TAKE PLACE ON THIS JOB WITH RESPECT TO THE ELECTRICAL WORK THAT IS GOING TO BE PERFORMED.



NEW 100 KW, 120/208V, 3Ø, 4W STANDBY EMERGENCY GENERATOR W/ 24 HOUR DIESEL BELLY TANK SEE SINGLE LINE DIAGRAM. CONFIRM LOCATION ON ARCH SITE PLAN. SEE SHEETS E52 AND E53 FOR FULL SPECIFICATIONS.

ELECTRICAL SITE PLAN - NE

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

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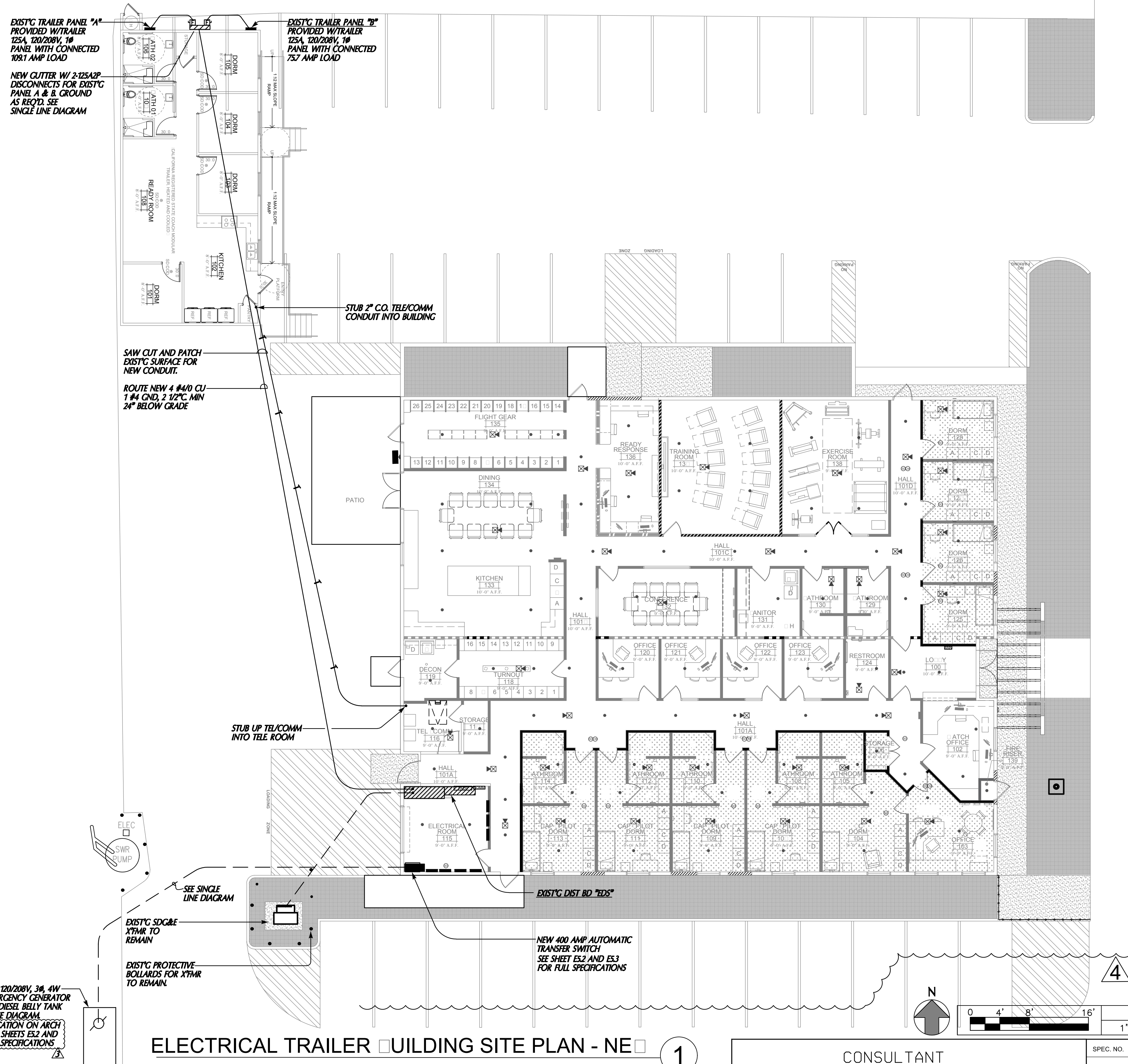


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CONSULTANT		SPEC. NO. 1732	
CITY OF SAN DIEGO, CALIFORNIA PUBLIC WORKS DEPARTMENT SHEET 13 OF 24 SHEETS		DATE 5/9/2018 RCE# C60990	
APPROVED: <i>[Signature]</i> FOR CITY ENGINEER ELIF CETIN PRINT DCE NAME		SUBMITTED BY: JIHAD SLEIMAN PROJECT MANAGER CHECKED BY: JAMES BOTICA PROJECT ENGINEER	
DESCRIPTION	BY	APPROVED	DATE FILMED
1			12/07/17
2			01/16/18
3			03/06/18
4			
CONTRACTOR INSPECTOR		DATE STARTED DATE COMPLETED	
		238-1728 CCS27 COORDINATE	
		236-1728 CCS27 COORDINATE	
		39665-13-D	



4
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PLANS FOR THE CONSTRUCTION OF

ELECTRICAL SITE PLAN - NE

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 14 OF 24 SHEETS

APPROVED BY: <i>[Signature]</i> FOR CITY ENGINEER ELIF CETIN PRINT DCE NAME	DATE: 5/9/2018 C60990 RCE#	SUBMITTED BY: JIHAD SLEIMAN PROJECT MANAGER CHECKED BY: JAMES BOTICA PROJECT ENGINEER		
DESCRIPTION	BY	APPROVED	DATE	FILMED
1 BUILDING DEPT	D.P.N.		11/07/17	
2 OWNER CHANGE	D.P.N.		12/07/17	
3 CONST. REVIEW	D.P.N.		01/16/18	
4	D.P.N.		03/06/18	

DATE STARTED: _____
DATE COMPLETED: _____

39665-14-D

CONSTRUCTION CHANGE / ADDENDUM			
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The City of
SAN DIEGO Public Works

CONSULTANT

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NEDC@FALCONNET

PROFESSIONAL SEAL
No. E 8838
Exp. 06/30/18
ELIF CETIN
ELECTRICAL ENGINEER
STATE OF CALIFORNIA

PLOT DATE: 3-06-18

CONTRACTOR INSPECTOR

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ EDS = 35675 SC (PER FAULT CURRENT CALC)
 DETERMINE "F" FACTOR TO 3Ø PANEL - P

$F = \frac{173 \times 40 \times 35675}{5906 \times 208}$

$F = \frac{2,468,710}{1,228,448}$

F = 2.0096

CALC 'M'

$M = \frac{1}{3.0096}$

M = 0.3322

ISCA @ PANEL - P
 = 35675 X 0.3322
 = 11,851 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ MSB = 42,000 SC (PER SDG&E SERVICE GUIDE)
 DETERMINE "F" FACTOR TO 3Ø PANEL - HVAC

$F = \frac{173 \times 35 \times 42000}{12843 \times 208}$

$F = \frac{2,543,100}{2,671,344}$

F = 0.9519

CALC 'M'

$M = \frac{1}{1.9519}$

M = 0.5123

ISCA @ PANEL - HVAC
 = 42000 X 0.5123
 = 21566 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ MSB = 42,000 SC (PER SDG&E SERVICE GUIDE)
 DETERMINE "F" FACTOR TO 3Ø PANEL - EDS

$F = \frac{173 \times 20 \times 42000}{(2)19703 \times 208}$

$F = \frac{1,453,200}{8,196,448}$

F = 0.1772

CALC 'M'

$M = \frac{1}{1.1772}$

M = 0.8494

ISCA @ PANEL - EDS
 = 42000 X 0.8494
 = 35,674.8 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ EDS = 35675 SC (PER FAULT CURRENT CALC)
 DETERMINE "F" FACTOR TO 3Ø PANEL - L

$F = \frac{173 \times 35 \times 35675}{5906 \times 208}$

$F = \frac{2,160,121}{1,228,448}$

F = 1.7584

CALC 'M'

$M = \frac{1}{2.7584}$

M = 0.3625

ISCA @ PANEL - L
 = 35675 X 0.3625
 = 12932 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ EDS = 35675 SC (PER FAULT CURRENT CALC)
 DETERMINE "F" FACTOR TO 3Ø PANEL - EL

$F = \frac{173 \times 45 \times 35675}{5906 \times 208}$

$F = \frac{2,777,298}{1,228,448}$

F = 2.2608

CALC 'M'

$M = \frac{1}{3.2608}$

M = 0.3066

ISCA @ PANEL - EL
 = 35675 X 0.3066
 = 10,938 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ EDS = 35675 SC (PER FAULT CURRENT CALC)
 DETERMINE "F" FACTOR TO 3Ø PANEL - MDPC

$F = \frac{173 \times 45 \times 35675}{5906 \times 208}$

$F = \frac{2,777,298}{1,228,448}$

F = 2.2608

CALC 'M'

$M = \frac{1}{3.2608}$

M = 0.3066

ISCA @ PANEL - MDPC
 = 35675 X 0.3066
 = 10,938 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ EDS = 35675 SC (PER FAULT CURRENT CALC)
 DETERMINE "F" FACTOR TO 3Ø PANEL - FAA

$F = \frac{173 \times 45 \times 35675}{8924 \times 208}$

$F = \frac{2,777,298}{1,856,192}$

F = 1.4962

CALC 'M'

$M = \frac{1}{2.4962}$

M = 0.4006

ISCA @ PANEL - FAA
 = 35675 X 0.4006
 = 14291 AMPS

FIRE RESCUE AIR OPS FACILITY
3Ø SHORT CIRCUIT CURRENT EVALUATION
POINT - TO - POINT

ISC @ EDS = 35675 SC (PER FAULT CURRENT CALC)
 DETERMINE "F" FACTOR TO 3Ø PANEL - EPIA

$F = \frac{173 \times 45 \times 35675}{5906 \times 208}$

$F = \frac{2,777,298}{1,228,448}$

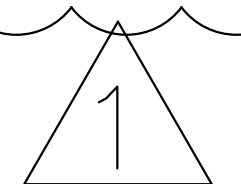
F = 2.2608

CALC 'M'

$M = \frac{1}{3.2608}$

M = 0.3066

ISCA @ PANEL - EPIA
 = 35675 X 0.3066
 = 10,938 AMPS



E5.1

ELECTRICAL CALCS

PLANS FOR THE CONSTRUCTION OF

ELECTRICALCALCS

WBS _____

CITY OF SAN DIEGO, CALIFORNIA
 PUBLIC WORKS DEPARTMENT
 SHEET 16 OF 24 SHEETS

APPROVED: *[Signature]* DATE: 5/9/2018
 FOR CITY ENGINEER: ELIF CETIN DATE: C60990
 PRINT DCE NAME: RCE# _____

FOR CITY ENGINEER: ELIF CETIN
 CHECKED BY: JAMES BOTICA
 PROJECT ENGINEER

DESCRIPTION	BY	APPROVED	DATE	FILMED
1 BUILDING DEPT	D.P.N.		11/07/17	
2 OWNER CHANGE	D.P.N.		12/07/17	
3 CONST. REVIEW	D.P.N.		01/16/18	
4	D.P.N.		03/06/18	

DATE STARTED _____ DATE COMPLETED _____

39665-16-D

CONSULTANT

SPEC. NO. 1732

1053 TENTH AVENUE
 SAN DIEGO, CA 92101
 PHONE 619.238.3811
 FAX 619.238.0442
 www.davyarchitecture.com

NEDC, INC.
 ELECTRICAL DESIGN CONSULTANTS
 AN ENGINEERING CORPORATION

3103 FALCON STREET, SUITE J
 SAN DIEGO, CALIFORNIA 92108
 (619) 278-0076 • FAX (619) 278-0078
 NEDC@PACBELL.NET

PLAT DATE: 9-06-18

CONTRACTOR _____ DATE STARTED _____
 INSPECTOR _____ DATE COMPLETED _____

CONSTRUCTION CHANGE / ADDENDUM			
CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

0 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

A. General Information
Climate Zone: 7
Conditioned Floor Area: 7,894
Unconditioned Floor Area: g

B. Lighting Compliance Documents (select yes for each document included)

YES	NO	COMP. DOC.	TITLE
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-01-E	Certificate of Compliance. All Pages required on plans for all submittals.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-02-E	Lighting Controls, Certificate of Compliance, and PAF Calculation. All Pages required on plans for all submittals.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-03-E	Indoor Lighting Power Allowance
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-04-E	Typical Room Worksheets
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-05-E	Line Voltage Track Lighting Worksheets
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-06-E	Indoor Lighting Existing Conditions

STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

C. Summary of Allowed Lighting Power
Conditioned and Unconditioned space lighting must not be combined for compliance.

Room	Installed Lighting Power (Watts)	Allowed Lighting Power (Watts)
01	4,033	4,033
02	1,143	1,143
03	4,890	4,890
04	6,787	6,787

D. Declaration of Required Certificates of Installation

YES	NO	Compliance Document/Title	Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-01-E - Must be submitted for all buildings.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-02-E - Must be submitted for a lighting control system, or for an Energy Management Control System (EMCS), to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-03-E - Must be submitted for a line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection panel used to energize only line-voltage track lighting, to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-04-E - Must be submitted for two tracked systems serving an auditorium, a convention center, a conference room, a multipurpose room, or a theater to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-05-E - Must be submitted for a Power Adjustment Factor (PAF) to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-06-E - Must be submitted for additional wattage installed in a video conferencing studio to be recognized for compliance.	<input type="checkbox"/>

STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

E. Declaration of Required Certificates of Acceptance

YES	NO	Compliance Document/Title	Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-03-A - Must be submitted for automatic daylight controls.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-04-A - Must be submitted for demand responsive lighting controls.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-05-A - Must be submitted for institutional tuning power adjustment factor (PAF).	<input type="checkbox"/>

F. Indoor Lighting Schedule and Field Inspection Energy Checklist

Room	Complete Luminaire Description	Watts per Luminaire	How wattage was determined	Number of Luminaires	Watts Installed (Watts x Qty)	Location	Field Inspector
01	A 2X2 RECESSED LED (E-3, 3 lamp fluorescent troffer, F3278, one dimmable electronic ballast)	31.0	03	24	744	Corridor/Restroom/Support	<input type="checkbox"/>
02	A 2X2 RECESSED LED (E-3, 3 lamp fluorescent troffer, F3278, one dimmable electronic ballast)	19.9	03	9	179	Police Fire Station	<input type="checkbox"/>
03	B 2X4 RECESSED LED	52.0	03	6	312	Exercise Room	<input type="checkbox"/>
04	B 2X4 RECESSED LED	52.0	03	17	884	Convention/Conference/Meeting	<input type="checkbox"/>
05	B 2X4 RECESSED LED	52.0	03	17	884	Office <= 250 sqft	<input type="checkbox"/>
06	B 2X4 RECESSED LED	52.0	03	2	104	Lobby, Main Entry	<input type="checkbox"/>
07	B 2X4 RECESSED LED	52.0	03	9	468	Dining	<input type="checkbox"/>
08	B 2X4 RECESSED LED	52.0	03	2	104	Electrical, Mechanical Room	<input type="checkbox"/>
09	BF 2X4 RECESSED LED	52.0	03	1	52	Corridor/Restroom/Support	<input type="checkbox"/>

STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

G. Installed Portable Luminaires in Offices - Exception to Section 140.6(a)

Room	Complete Luminaire Description	Watts per Luminaire	Number of Luminaires	Watts Installed	Location	Field Inspector
1	A 2X2 RECESSED LED (E-3, 3 lamp fluorescent troffer, F3278, one dimmable electronic ballast)	31.0	24	744	Corridor/Restroom/Support	<input type="checkbox"/>
2	B 2X4 RECESSED LED	52.0	6	312	Exercise Room	<input type="checkbox"/>
3	B 2X4 RECESSED LED	52.0	17	884	Convention/Conference/Meeting	<input type="checkbox"/>
4	B 2X4 RECESSED LED	52.0	17	884	Office <= 250 sqft	<input type="checkbox"/>
5	B 2X4 RECESSED LED	52.0	2	104	Lobby, Main Entry	<input type="checkbox"/>
6	B 2X4 RECESSED LED	52.0	9	468	Dining	<input type="checkbox"/>
7	B 2X4 RECESSED LED	52.0	2	104	Electrical, Mechanical Room	<input type="checkbox"/>
8	BF 2X4 RECESSED LED	52.0	1	52	Corridor/Restroom/Support	<input type="checkbox"/>

STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

H. Indoor Lighting Schedule and Field Inspection Energy Checklist

Room	Complete Luminaire Description	Watts per Luminaire	How wattage was determined	Number of Luminaires	Watts Installed (Watts x Qty)	Location	Field Inspector
01	A 2X2 RECESSED LED (E-3, 3 lamp fluorescent troffer, F3278, one dimmable electronic ballast)	31.0	03	24	744	Corridor/Restroom/Support	<input type="checkbox"/>
02	A 2X2 RECESSED LED (E-3, 3 lamp fluorescent troffer, F3278, one dimmable electronic ballast)	19.9	03	9	179	Police Fire Station	<input type="checkbox"/>
03	B 2X4 RECESSED LED	52.0	03	6	312	Exercise Room	<input type="checkbox"/>
04	B 2X4 RECESSED LED	52.0	03	17	884	Convention/Conference/Meeting	<input type="checkbox"/>
05	B 2X4 RECESSED LED	52.0	03	17	884	Office <= 250 sqft	<input type="checkbox"/>
06	B 2X4 RECESSED LED	52.0	03	2	104	Lobby, Main Entry	<input type="checkbox"/>
07	B 2X4 RECESSED LED	52.0	03	9	468	Dining	<input type="checkbox"/>
08	B 2X4 RECESSED LED	52.0	03	2	104	Electrical, Mechanical Room	<input type="checkbox"/>
09	BF 2X4 RECESSED LED	52.0	03	1	52	Corridor/Restroom/Support	<input type="checkbox"/>

STATE OF CALIFORNIA
INDOOR LIGHTING - LIGHTING CONTROLS
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING - LIGHTING CONTROLS
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

A. Mandatory Lighting Control Declaration Statements (Indicate if the measure applies by checking yes or no below.)

YES	NO	Control Requirements
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting shall be controlled by self-contained lighting control devices which are certified to the Energy Commission according to the Title 20 Appliance Efficiency Regulations in accordance with Section 130.9.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting shall be controlled by a lighting control system or energy management control system in accordance with 1310.9. An Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	One or more Track Lighting Integral Current Limiter shall be installed which have been certified to the Energy Commission in accordance with 1310.9 and 1310.10. Additionally, an Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A Track Lighting Supplementary Overcurrent Protection Panel shall be installed in accordance with Section 131.9 and Section 130.10. Additionally, an Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All lighting controls and equipment shall comply with the applicable requirements in 1310.9 and shall be installed in accordance with the manufacturer's instructions in accordance with Section 130.1.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All luminaires shall be functionally controlled with manually switched ON and OFF lighting controls in accordance with Section 130.1(a).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	General lighting shall be separately controlled from all other lighting systems in an area. Floor and wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less. When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled, in accordance with Section 130.1(a).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The general lighting of any enclosed area 100 square feet or larger, with a connected lighting load that exceeds 0.5 watts per square foot shall meet the multi-level lighting control requirements in accordance with Section 130.1(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All installed indoor lighting shall be equipped with controls that meet the applicable Shut-Off control requirements in Section 130.1(c).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting in all Daylight Zones shall be controlled in accordance with the requirements in Section 130.1(a) and daylight zones are shown on the plans.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting power in buildings larger than 10,000 square feet shall be capable of being automatically reduced in response to a Demand Responsive Signal in accordance with Section 130.1(a).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Before an occupancy permit is granted for a newly constructed building or area, or a new lighting system serving a building, area, or site is operated for normal use, indoor lighting controls serving the building, area, or site shall be certified as meeting the Acceptance Requirements for Code Compliance in accordance with Section 130.4(a). The controls required to meet the Acceptance Requirements include automatic daylight controls, automatic shut-off controls, and demand responsive controls.

STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

I. Declaration of Required Certificates of Installation

YES	NO	Compliance Document/Title	Field Inspector
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-01-E - Must be submitted for all buildings.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-02-E - Must be submitted for a lighting control system, or for an Energy Management Control System (EMCS), to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-03-E - Must be submitted for a line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection panel used to energize only line-voltage track lighting, to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-04-E - Must be submitted for two tracked systems serving an auditorium, a convention center, a conference room, a multipurpose room, or a theater to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-05-E - Must be submitted for a Power Adjustment Factor (PAF) to be recognized for compliance.	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	NRCC-LT-06-E - Must be submitted for additional wattage installed in a video conferencing studio to be recognized for compliance.	<input type="checkbox"/>

STATE OF CALIFORNIA
INDOOR LIGHTING
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

DOCUATIONATION AUTHORS DECLARATION STATEMENT
 I, certify that this Certificate of Compliance documentation is accurate and complete.
 Declaration Author: MILTON C. NIEDERHAUS
 Signature Date: 12/7/2017
 Address: 3103 FALCON STREET SUITE J, SAN DIEGO, CA 92103
 Phone: 619 278 0076

RESPONSIBLE DESIGNER'S DECLARATION STATEMENT
 I certify the following under penalty of perjury, under the laws of the State of California:
 1. The information provided on this Certificate of Compliance is true and correct.
 2. I am eligible under Section 31 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
 3. The building design features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
 4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
 5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.
 Responsible Designer: Milton C. Niederhaus
 Signature Date: 12/2017
 Address: 3103 Falcon Street, Suite J, San Diego, CA 92103
 Phone: (619) 278 0076

STATE OF CALIFORNIA
INDOOR LIGHTING - LIGHTING CONTROLS
CERTIFICATE OF COMPLIANCE
INDOOR LIGHTING - LIGHTING CONTROLS
Project Name: FIRE RESCUE AIR OPS FACILITY
Date Prepared: 12/7/2017

A. Mandatory Lighting Control Declaration Statements (Indicate if the measure applies by checking yes or no below.)

YES	NO	Control Requirements
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting shall be controlled by self-contained lighting control devices which are certified to the Energy Commission according to the Title 20 Appliance Efficiency Regulations in accordance with Section 130.9.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting shall be controlled by a lighting control system or energy management control system in accordance with 1310.9. An Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	One or more Track Lighting Integral Current Limiter shall be installed which have been certified to the Energy Commission in accordance with 1310.9 and 1310.10. Additionally, an Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A Track Lighting Supplementary Overcurrent Protection Panel shall be installed in accordance with Section 131.9 and Section 130.10. Additionally, an Installation Certificate shall be submitted in accordance with Section 130.4(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All lighting controls and equipment shall comply with the applicable requirements in 1310.9 and shall be installed in accordance with the manufacturer's instructions in accordance with Section 130.1.
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<input checked="" type="checkbox"/>	<input type="checkbox"/>	General lighting shall be separately controlled from all other lighting systems in an area. Floor and wall display, window display, case display, ornamental, and special effects lighting shall each be separately controlled on circuits that are 20 amps or less. When track lighting is used, general, display, ornamental, and special effects lighting shall each be separately controlled, in accordance with Section 130.1(a).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The general lighting of any enclosed area 100 square feet or larger, with a connected lighting load that exceeds 0.5 watts per square foot shall meet the multi-level lighting control requirements in accordance with Section 130.1(b).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All installed indoor lighting shall be equipped with controls that meet the applicable Shut-Off control requirements in Section 130.1(c).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting in all Daylight Zones shall be controlled in accordance with the requirements in Section 130.1(a) and daylight zones are shown on the plans.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lighting power in buildings larger than 10,000 square feet shall be capable of being automatically reduced in response to a Demand Responsive Signal in accordance with Section 130.1(a).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Before an occupancy permit is granted for a newly constructed building or area, or a new lighting system serving a building, area, or site is operated for normal use, indoor lighting controls serving the building, area, or site shall be certified as meeting the Acceptance Requirements for Code Compliance in accordance with Section 130.4(a). The controls required to meet the Acceptance Requirements include automatic daylight controls, automatic shut-off controls, and demand responsive controls.

E6.0

PLANS FOR THE CONSTRUCTION OF
ELECTRICAL T-24 SCHEDULES

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 17 OF 24 SHEETS

APPROVED: [Signature] DATE: 5/9/2018
FOR CITY ENGINEER: ELIF CETIN
PRINT DCE NAME: RCE# C60990

DATE STARTED: 11/07/17
DATE COMPLETED: 03/06/18

39665-17-D

CONSULTANT

DAVY ARCHITECTURE
1053 TENTH AVENUE
SAN DIEGO, CA 92101
PHONE: 619.238.3811
WWW.DAVYARCHITECTURE.COM

NEDC, INC.
ELECTRICAL DESIGN CONSULTANTS
AN ENGINEERING CORPORATION
3103 FALCON STREET, SUITE J
SAN DIEGO, CALIFORNIA 92103
(619) 278-0076 • FAX (619) 278-0078
NEDC@PACBELNET

CONTRACTOR INSPECTOR

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
OUTDOOR LIGHTING CONTROLS
CERTIFICATE OF COMPLIANCE
Project Name: FIRE RESCUE AIR OPS FACILITY Date Prepared: 12/7/2017

Documentation Author Name: MILTON C NIEDERHAUS
Company: NEDC, Inc. Signature Date: 12/7/2017
Address: 3103 FALCON STREET SUITE J City/State/Zip: SAN DIEGO, CA 92103
Phone: 619 278 0076

Responsible Person's Declaration Statement
I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Milton C. Niederhaus
Company: NEDC, INC. Date Signed: 12/7/2017
Address: 3103 Falcon Street, Suite J City/State/Zip: San Diego, CA 92103
Phone: (619) 278 0076

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
OUTDOOR LIGHTING POWER ALLOWANCES
CERTIFICATE OF COMPLIANCE
Project Name: FIRE RESCUE AIR OPS FACILITY Date Prepared: 12/7/2017

A. OUTDOOR LIGHTING POWER ALLOWANCE SUMMARY
1. General Hardship Lighting Power Allowance (See Total from Section B of NRCC-LTO-03-E) 777
2. Additional Specific "use it or lose it" Lighting Power Allowances listed in each of these cells shall be identical to total allowed watts determined in Section C-1 to C-4 of NRCC-LTO-03-E.

PER APPLICATION from Section C-1	PER UNIT LENGTH (SALES FRONTAGE) from Section C-2	PER HARDSHIP AREA (ORNAMENTAL LIGHTING) from Section C-3	PER SPECIFIC AREA from Section C-4	
0	0	0	0	0
3. Sum Total ALLOWED Outdoor Lighting Wattage (add rows 1 and 2)				777

B. GENERAL HARDSHIP LIGHTING POWER ALLOWANCE FROM TABLE 140.7-A

Area Wattage Allowance (AWA)	Illuminated Hardship Area		Linear Wattage Allowance (LWA)		Initial Wattage Allowance (IWA)		Total General Hardship Lighting Allowance
	01	02	03	04	05	06	
Name of Area	Illuminated Hardship Area	AWA Per Square Foot	AWA (102 x 803)	Perimeter Length of General Hardship	LWA per Linear Foot	IWA (804 x 807 x 808)	
PEDESTRIAN HARDSHIP	1,602	0.040	64	552	0.350	193	777
TOTAL							777

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
OUTDOOR LIGHTING POWER ALLOWANCES
CERTIFICATE OF COMPLIANCE
Project Name: FIRE RESCUE AIR OPS FACILITY Date Prepared: 12/7/2017

C. ADDITIONAL "USE IT OR LOSE IT" OUTDOOR LIGHTING POWER ALLOWANCES FOR SPECIFIC APPLICATIONS
 The additional specific outdoor lighting power allowance shall be smaller of the allowed lighting power or the actual lighting power used.
 Use Outdoor Lighting Zone (OLZ) that is documented on page 1 of NRCC-LTO-01-E to calculate the specific wattage allowances.

C-1. WATTAGE ALLOWANCE PER APPLICATION - Table 140.7-B
 Available only for qualifying locations, which include Building Entrances or Exits; Primary Entrances to Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities; Drive Up Windows; Vehicle Service Station Uncovered Fuel Dispenser, ATM Machine Lighting
 If more than one luminaire type is used per location, use multiple rows for that location

01	02	03	04	05	06	07	08	09	10
Name of Location for Which Allowance is Claimed	Number of Qualifying Locations	Wattage Allowance per Qualifying Location	Alotted Watts (02 x 03)	Luminaire Code or Symbol	Luminaire Description	Luminaire Quantity	Watts per Luminaire	Design Watts (07 x 08)	Allowed Watts (smaller of 04 or 09)
Sum total allowance per application on this site: 0									

C-2. WATTAGE ALLOWANCE PER UNIT LENGTH (Sales Frontage) from Table 140.7-B
 If more than one luminaire type is used per location, use multiple rows for that location

01	02	03	04	05	06	07	08	09	10
Name of Location for Which Allowance is Claimed	Linear Feet of Sales Frontage	Wattage Allowance per Linear Foot	Alotted Watts (02 x 03)	Luminaire Code or Symbol	Luminaire Description	Luminaire Quantity	Watts per Luminaire	Design Watts (07 x 08)	Allowed Watts (smaller of 04 or 09)
Sum total allowance for sales frontage on the site: 0									

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
OUTDOOR LIGHTING POWER ALLOWANCES
CERTIFICATE OF COMPLIANCE
Project Name: FIRE RESCUE AIR OPS FACILITY Date Prepared: 12/7/2017

C-3. WATTAGE ALLOWANCE PER SQUARE FOOT OF HARDSHIP AREA (Ornamental Lighting) - Table 140.7-B
 Allowance for the total site illuminated hardship area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130.0(C), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers.
 If more than one luminaire type is used per location, use multiple rows for that location

01	02	03	04	05	06	07	08	09	10
Name of area for which ornamental allowance is claimed	Square Feet of Hardship	Wattage Allowance per Square Foot	Alotted Watts (02 x 03)	Luminaire Code or Symbol	Luminaire Description	Luminaire Quantity	Watts per Luminaire	Design Watts (07 x 08)	Allowed Watts (smaller of 04 or 09)
Sum total allowance for ornamental lighting on the site: 0									

C-4. WATTAGE ALLOWANCE PER SQUARE FOOT OF SPECIFIC AREA - Table 140.7-B
 Allowances for Building Facades; Outdoor Sales Leds; Vehicle Service Station Hardship; Vehicle Service Station Canopies; Sales Canopies; Non-sales Canopies; Tunnels; Guard Stations; Student Pick-up/Drop-off zone; Outdoor Dining; Special Security Lighting for Retail Parking and Pedestrian Hardship.
 If more than one luminaire type is used per location, use multiple rows for that location

01	02	03	04	05	06	07	08	09	10
Name of Location for Which Allowance is Claimed	Illuminated Area of Application	Wattage Allowance per square Foot	Alotted Watts (02 x 03)	Luminaire Code or Symbol	Luminaire Description	Luminaire Quantity	Watts per Luminaire	Design Watts (07 x 08)	Allowed Watts (smaller of 04 or 09)
Sum total allowance for specific area on the site: 0									

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION
OUTDOOR LIGHTING POWER ALLOWANCES
CERTIFICATE OF COMPLIANCE
Project Name: FIRE RESCUE AIR OPS FACILITY Date Prepared: 12/7/2017

Documentation Author Name: MILTON C NIEDERHAUS
Company: NEDC, Inc. Signature Date: 12/7/2017
Address: 3103 FALCON STREET SUITE J City/State/Zip: SAN DIEGO, CA 92103
Phone: 619 278 0076

Responsible Person's Declaration Statement
I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Milton C. Niederhaus
Company: NEDC, INC. Date Signed: 12/7/2017
Address: 3103 Falcon Street, Suite J City/State/Zip: San Diego, CA 92103
Phone: (619) 278 0076

CA Building Energy Efficiency Standards - 2016 Nonresidential Compliance January 2016

ELECTRICAL CONTRACTOR SHALL PROVIDE AND INCLUDE IN THEIR FEES PROPERLY COMPLETED AND SIGNED CERTIFICATES OF INSTALLATION AND CERTIFICATES OF ACCEPTANCE AND SHALL BE PROVIDED TO THE INSPECTOR IN THE FIELD. (CREES 10-103)

2

2

E6.3

PLANS FOR THE CONSTRUCTION OF
ELECTRICAL T-24 SCHEDULES

CONSULTANT

DAVY ARCHITECTURE
1053 TENTH AVENUE
SAN DIEGO, CA 92101
PHONE 619.238.3811
FAX 619.238.0442
www.davyarchitecture.com

NEDC, INC.
ELECTRICAL DESIGN CONSULTANTS
AN ENGINEERING CORPORATION
3103 FALCON STREET, SUITE J
SAN DIEGO, CALIFORNIA 92103
(619) 278-0076 • FAX (619) 278-0078
NEDC@CAPPELLNET

SPEC. NO. 1732

CITY OF SAN DIEGO, CALIFORNIA
PUBLIC WORKS DEPARTMENT
SHEET 20 OF 24 SHEETS

APPROVED: ELIF CETIN FOR CITY ENGINEER
DATE: 5/9/2018
DATE: 11/07/17
RCE# C60990

PRINT DCE NAME

DESCRIPTION	BY	APPROVED	DATE	FILMED
1 BUILDING DEPT	D.P.N.		11/07/17	
2 OWNER CHANGE	D.P.N.		12/07/17	
3 CONST. REVIEW	D.P.N.		01/16/18	
4	D.P.N.		03/06/18	

CONTRACTOR INSPECTOR

DATE STARTED DATE COMPLETED

39665-20-D

CONSTRUCTION CHANGE / ADDENDUM

CHANGE	DATE	AFFECTED OR ADDED SHEET NUMBERS	APPROVAL NO.

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE



MODULAR BUILDING CONCEPTS INC.

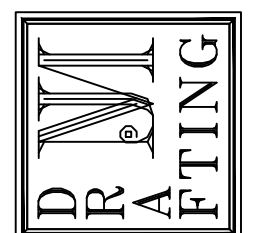
12580 STOTLER COURT
POWAY, CA 92064

PROJECT: 24'X50' DOUBLE WIDE FIRE-RESCUE DEPARTMENT FIRE STATION #22 1055 CATALINA BLVD. SAN DIEGO CA. 92107 MODULAR BUILDING

REVISION	DATE/ BY

FOR REFERENCE ONLY

JVM DRAFTING
ARCHITECTURAL DRAFTING AND DESIGN
CAD DRAWINGS
JULIAN MORALES



MBC
1258 STOTLER COURT
POWAY, CA. 92064 1326
(858) 679-1185 (858) 679-6804

PROJECT
24'X50' DOUBLE WIDE
FIRE-RESCUE DEPARTMENT
MODULAR BUILDING

COVER PAGE AND
GENERAL NOTES

DRAWN: JVM
CHK'D:
DATE: 6-2-15
SCALE: 1/4"=1'-0"
JOB NO.: 215-15
SHEET
C-1
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CONSTRUCTION NOTES	
CHASSIS SYSTEM:	INSULATION:
FRAME M12" X 10.8 JUNIOR I-BEAM CHASSIS MAIN RAIL (OUTRIGGER)	EXTERIOR WALL R-19 UNFACED
CROSS MEMBER 7 1/2"x14 GA. Z-MEMBERS @ 96" O.C. 1 1/2"x1 1/2"x1/8" ANGLE IRON AT ALTERNATING 48" O.C.	FLOOR R-19 UNFACED
TIRES 8.00x14, 8 PLY (USED TIRES)	ROOF R-30 UNFACED
AXLES (RECYCLED) FOUR, STANDARD TWO WHEEL BRAKE w/ DETACHABLE HITCH.	INTERIOR WALL R-11 UNFACED
BOTTOM BOARD REINFORCED PLASTIC BOTTOM BOARD	PLUMBING:
FLOOR SYSTEM:	SUPPLY PIPING TYPE "L" COPPER
FRAMING 2X8 HF #2 @ 16" O.C.	WASTE PIPING ABS-DWV PIPING
DECKING 3/4" STURD-I-FLOOR DECKING T&G	PRESSURE RANGE 46-60 PSI
WALL SYSTEM:	PLUMBING TREE BY OTHERS
EXT. FRAMING 2x6 HF #2 STUD @ 16" O.C.	LOOSE SHIP:
INT. FRAMING 2x6 HF #2 STUD @ 16" O.C.	SKIRTING YES
CEILING SYSTEM:	FINISH SCHEDULE
HEIGHT 7'-11" NOMINAL	1 5/8" T-1-11 PLYWOOD SIDING W/ 6" GROOVES AND 7/16" MASONITE TRIM, 8" TOP & BOTTOM, 4" DOORS, CORNERS AND WINDOWS W/ 6" VERT. @ MODLINES & BTM.
FINISH SUSPENDED T-GRID	2 1/4" LUAN PANELING COLOR: HAMPTON GREY BIRCH W/1" BATS FOR BASEBOARD COLOR: "VINYL" TO MATCH PANELING.
ROOF SYSTEM:	3 .090 FRP OVER WALL FINISH W/ TRIM (48" A.F.F) ON BACK OF RESTROOM SINKS ONLY. COLOR: _____
MODLINE BEAM 50' PLYWOOD LAMINATED BEAM, 24" HT.	4 26 OZ. COMMERCIAL GRADE CARPET
FRAMING 2x8 DF-L #2 @ 16" O.C.	5 1/8" ARMSTRONG VCT COLOR: _____ 4" & 6" COVE BASE PER CODE COLOR: _____
DECKING 7/16" INDEX APA RATED SHEATHING	6
OVERHANG NONE	7 SUSPENDED T-BAR CEILING GRID W/RANDOM FISSURED MINERAL BOARD TILES HEAVY DUTY 755B 2X4 ARMSTRONG CEILING PANEL
PARAPET NONE	7a
MISC. NONE	8 WHITE EPDM .045 SINGLE-PLY RUBBER
HVAC SYSTEM:	9 I.D. LABEL
BRAND PKC036-1	10 H.C.D.. INSIGNIA
SIZE 3 TON ROOF MOUNT AC HEAT PUMP	(EXTERIOR BUILDING) PAINT SCHEDULE
COLOR GREY	BODY/HOOD:
HEAT STRIP 10kw	TRIM:
SUPPLY AIR FLEX DUCTED SUPPLY	EXTERIOR DOOR (INT.) TRIM:
RETURN AIR FLEX DUCTED RETURN	EXTERIOR DOOR (EXT.) TRIM:
ELECTRICAL:	EXTERIOR DOOR FRAME:
DISTRIBUTION SINGLE PHASE	GUTTER/DOWNSPOUTS
SUB PANEL (2) 125 AMP, 120/240V, 3 WIRE	
MAIN BREAKER NO	
WIRING #14 AWG MIN SHEATHED NM COPPER CABLE W/ GROUND (IN CONDUIT)	

DOOR SCHEDULE									
SYM	SIZE	THK.	DOOR MAT'L TYPE	JAMB MAT'L TYPE	JAMB TYPE	FIN GRP	HRD GRP	QTY	REMARKS
1	3070	1 3/4"	24ga. H.M.	ALUM BRONZE	ACTIVE			1	RLC-1 DOOR
2	3070	1-3/8"	WOOD	S.C.	TIMELY			4	
3			WOOD					2	RESTROOM
4	2470	1-3/8"	WOOD	H.C.	TIMELY			1	
5	2070	1-3/8"	WOOD	H.C.	TIMELY			1	
6									

WINDOW SCHEDULE							
SYM	SIZE	WINDOW TYPE	FRAME	GLASS	QTY	ROUGH OPENING	REMARKS
A	48X48"	HORIZ. SLIDER	WHITE VINYL	DUAL GLAZE CLEAR GLASS	3		
B	48X36"	HORIZ. SLIDER	WHITE VINYL	DUAL GLAZE CLEAR GLASS	1		
C	48X48"	HORIZ. SLIDER	WHITE VINYL	DUAL GLAZE CLEAR GLASS	1		2 HOUR WINDOW

WINDOW HEADER HEIGHT		MISCELLANEOUS	
EXTERIOR WINDOW:	84"		

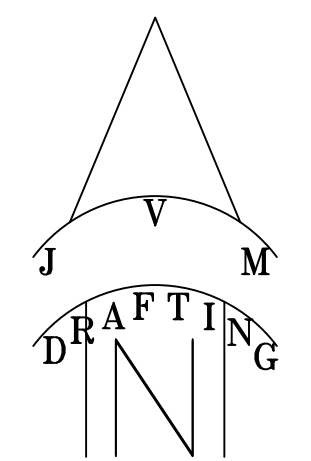
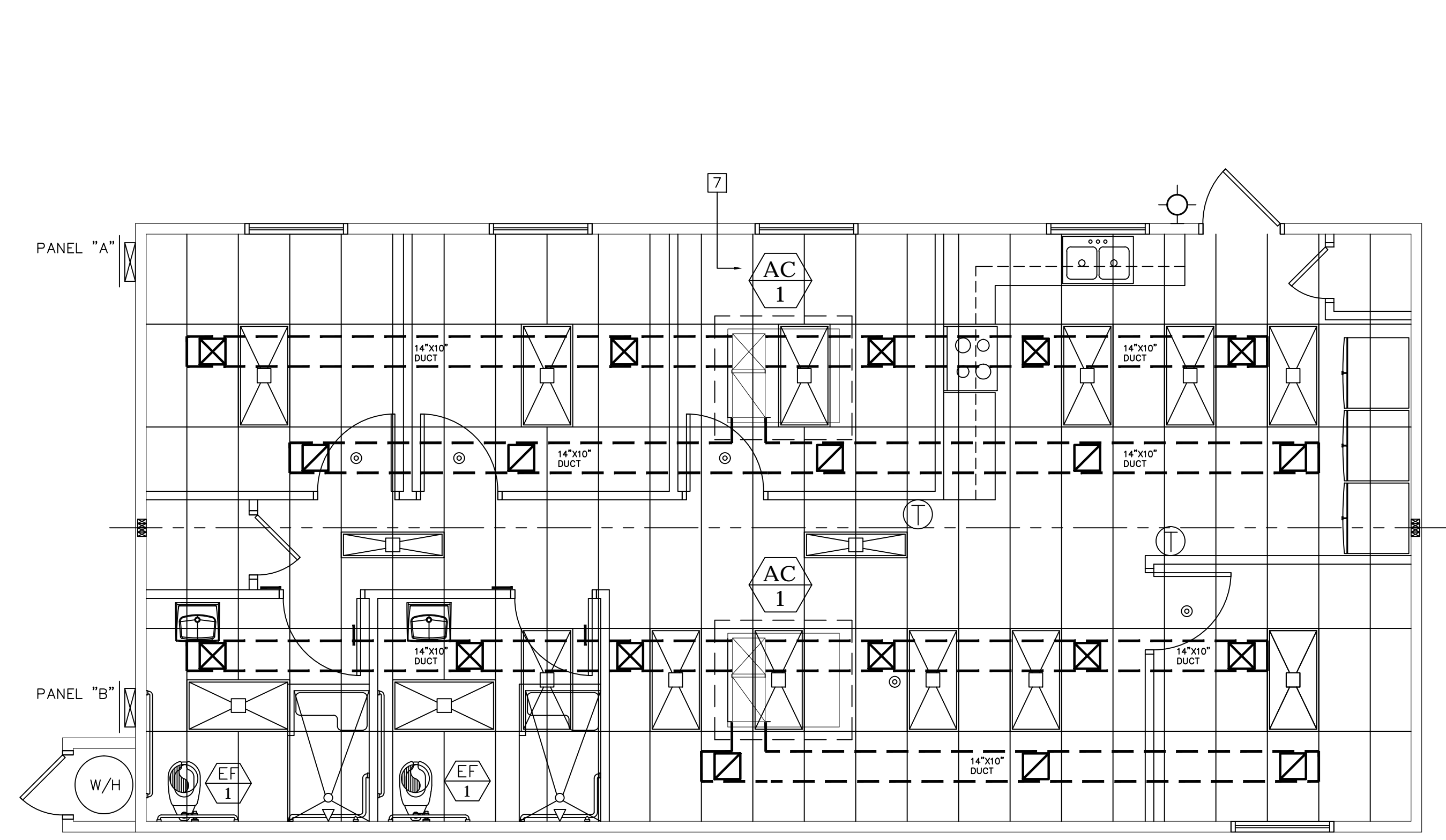
LOCATION FOR STATE APPROVAL STAMP	CUSTOMER SIGN-OFF STAMP

INDEX	(CABINETS) PAINT SCHEDULE
C-1 - COVER SHEET & GENERAL NOTES	NOTE:
A-1 - FLOOR, ELECTRICAL PLAN & PANEL SCHEDULE	
A-2 - REFLECTED CEIL., MECHANICAL PLANS & EXTERIOR ELEVATIONS	
A-3 - PLUMBING ISO., SCHEDULE GAS ISO AND SIGNAGE DETAILS	

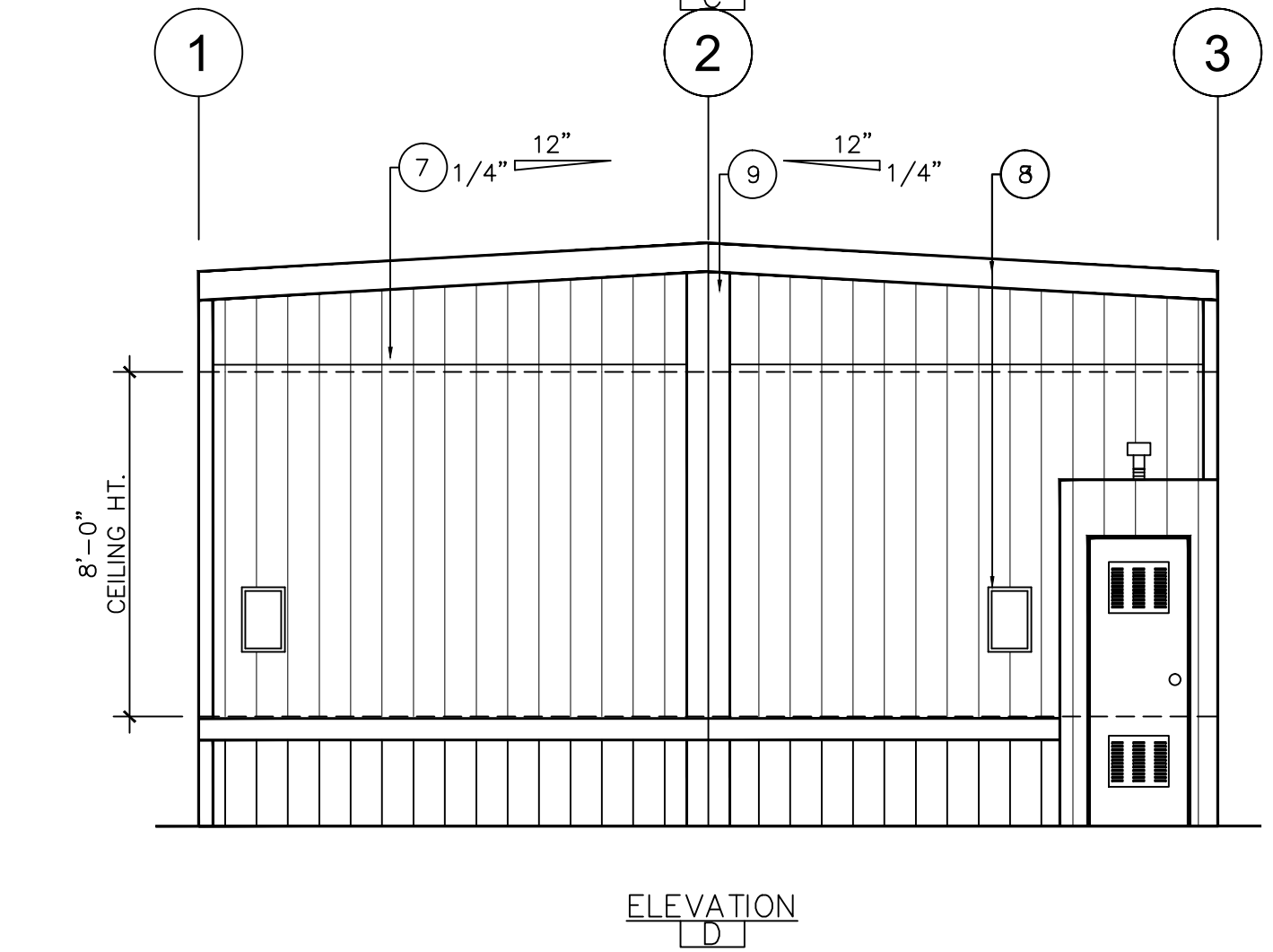
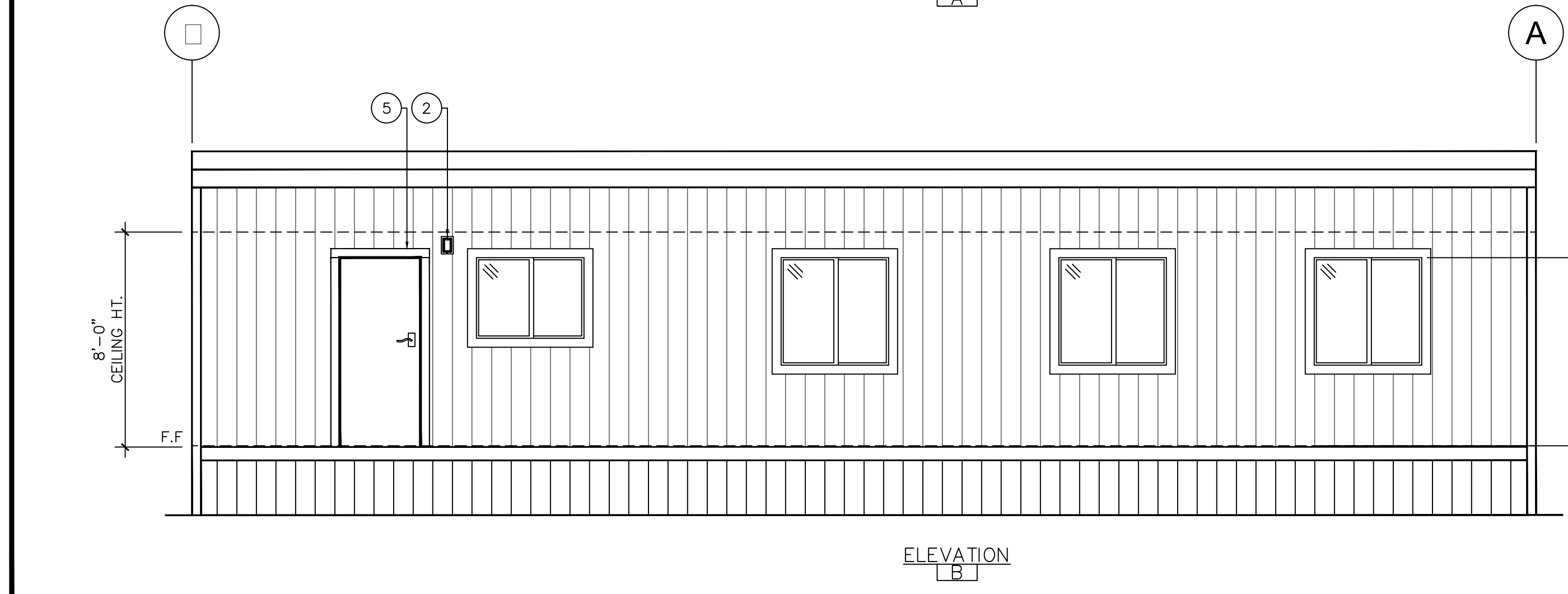
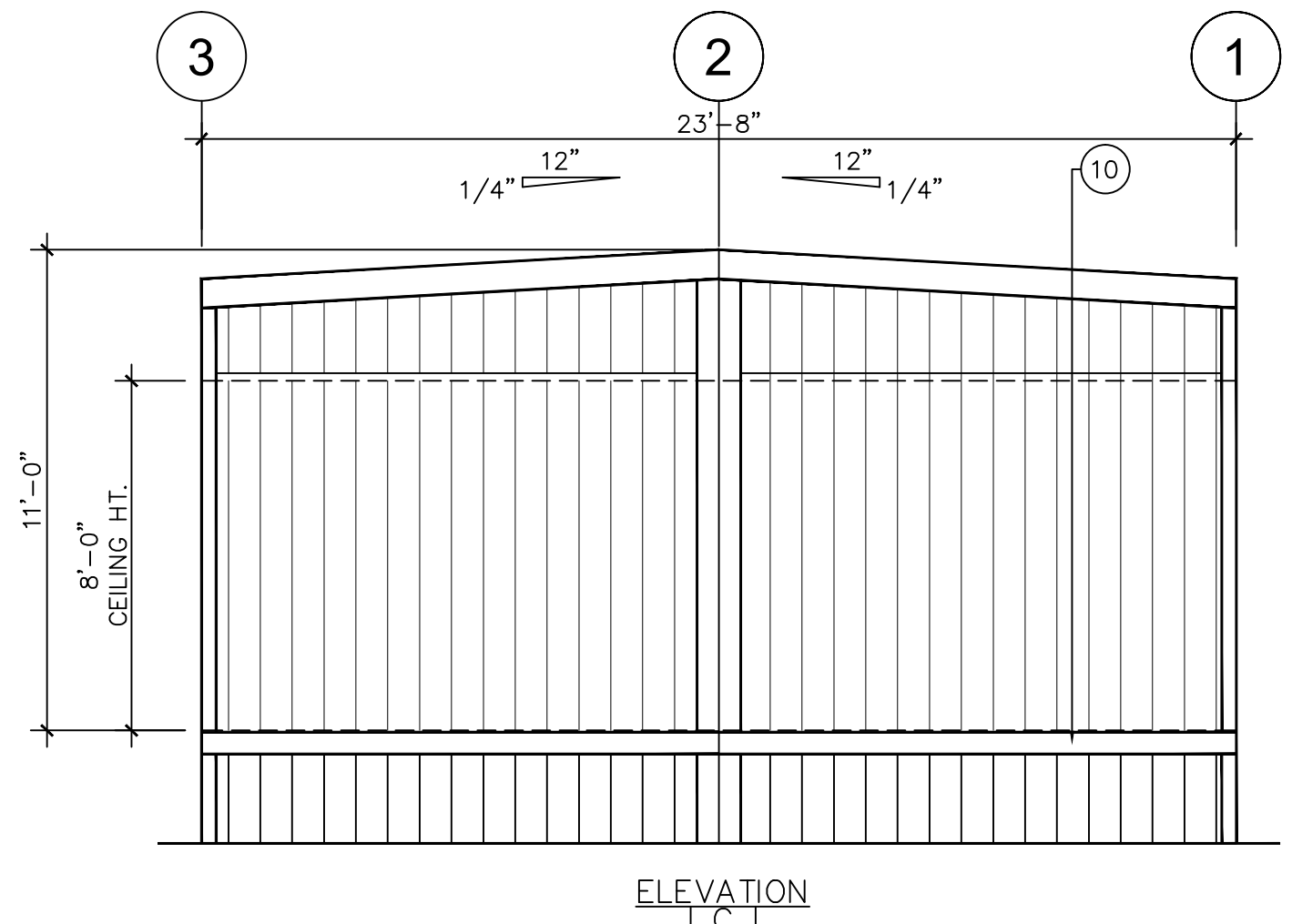
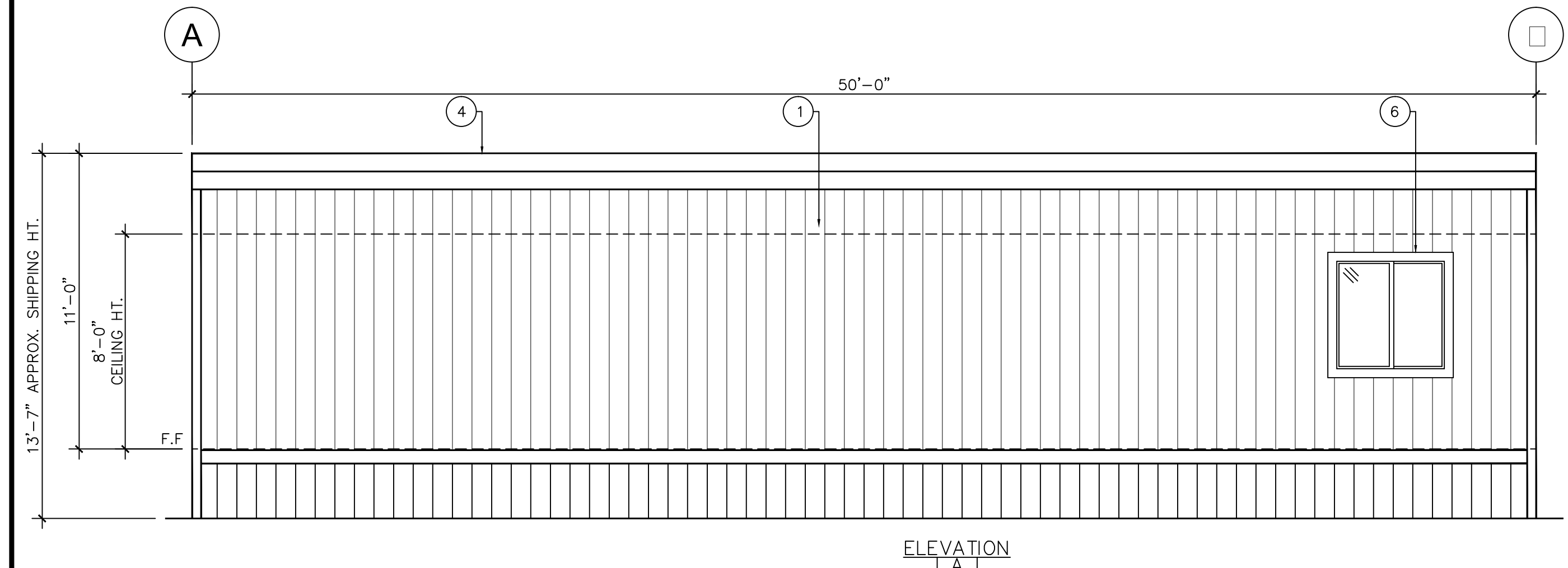
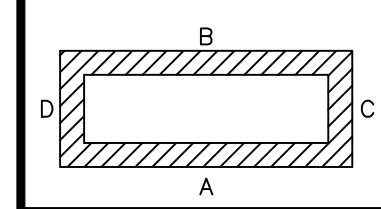
ATTENTION: THE FOLLOWING ITEMS WILL NEED TO BE SITE INSTALLED BY OTHERS DUE TO:
 MATERIAL CROSSING MATLINES
 WEIGHT RESTRICTIONS
 HEIGHT RESTRICTIONS
 CUSTOMER REQUEST
 CABINETS
 COUNTER TOPS
 TOILET PARTITIONS
 TOILETS
 SINKS
 WATER HEATER
 PLUMBING
 DOORS
 ROOF A/C
 ROOF VENT
 PLUMBING VENT
 SUSPENDED CEILING
 LIGHTS
 SEE SPECIFICATIONS AND SHIP LOOSE SHEETS FOR DETAILS

GENERAL NOTES -CALIFORNIA-	
1. R3 OCCUPANCY AND TYPE VB CONSTRUCTION.	
2. PROVIDE SIGN ADJACENT TO ENTRANCE STATING: "THIS DOOR TO REMAIN UNLOCKED DURING BUSINESS HOURS."	
3. THIS STRUCTURE IS NOT TO BE LOCATED LESS THAN 20 FEET FROM ACTUAL OR ASSUMED PROPERTY LINES.	
4. OCCUPANCY LOAD SHALL BE UNDER 6 MAXIMUM. WILL HAVE EXIT(S) AS INDICATED.	
5. EXIT DOOR SHALL BE OPENABLE FROM THE INSIDE WITHOUT USE OF KEY OR ANY SPECIAL KNOWLEDGE.	
6. LANDINGS AT EXIT DOORWAYS SHALL COMPLY WITH #3306 (G) CBC 2013 EDITION.	
7. INSTALL A MECHANICALLY OPERATED VENTILATING SYSTEM PROVIDING A MINIMUM OF 15 CFM PER OCCUPANT WITH 5 CFM OF OUTSIDE AIR.	
8. ROOF COVERING SYSTEM SHALL BE PER CHAPTER 32 OF THE 2013 CBC.	
9. GLAZING SHALL COMPLY WITH CHAPTER 54 OF THE 2013 CBC.	
10. SYSTEM TO BE USED FOR PLUMBING: AS SHOWN	
11. BUILDING IN ACCORDANCE WITH 2013 CBC, CMC, CPC, AND LATEST EDITION NEC.	
12. DESIGN LOADS: LIVE FLOOR 50 LBS/SQ. FT. LIVE ROOF 20 LBS/SQ. FT. WIND 70 MPH SEISMIC ZONE 4	
13. SEPARATE TOILET FACILITIES TO BE PROVIDED FOR EACH SEX IN ADJACENT BUILDING(S) ON SAME PROPERTY IF ADEQUATE TOILET FACILITIES ARE NOT PROVIDED IN BUILDING.	
14. BUILDING IS FOR RESIDENTIAL USE.	
15. THIS PLAN MAY BE REVISED AND OR MIRRORRED.	
16. CALIFORNIA STATE STRUCTURAL PACKAGE APPROVAL #:	
17. PROPOSED ADDRESS AND/OR LOCATION OF UNIT. 1055 CATALINA BLVD. SAN DIEGO, CA. 92110	

HVAC/ELECTRICAL LEGEND	
SYMBOL	DESCRIPTION
	DUPLEX RECEPT - 20a 125v 3 WIRE GROUNDING TYPE. "GFI" DENOTES GROUND FAULT INTERRUPTER
	DUPLEX RECEPT - 15a 125v 3 WIRE GROUNDING TYPE.
	EXT. DUPLEX RECEPT - 20a 125v 3 WIRE GROUND FAULT INTERRUPTER W/ WEATHER PROOF COVER
	SINGLE SWITCHES IN SINGLE GANG BOX
	DOUBLE SWITCHES IN DOUBLE GANG BOX (IVORY)
	TRIPLE SWITCHES IN TRIPLE GANG BOX (IVORY)
	DOUBLE THREE-WAY SWITCH W/ COVER PLATE @46" A.F.F. UNLESS NOTED OTHERWISE. BRAND: (2) LEVITON 1223-1
	INCANDESCENT SURFACE MOUNTED EXTERIOR LIGHT WITH IMPACT RESISTANT ENCLOSURE. 100 WATTS HARRIS 300. VANDAL PROOF.
	ELECTRICAL PANEL
	ROOF MOUNTED A/C
	2' x 4' FLUORESCENT DROP IN FIXTURE. ACRYLIC PRISMATIC LENS, ENERGY SAVING BALLAST.
	1' x 4' FLUORESCENT DROP IN FIXTURE. ACRYLIC PRISMATIC LENS, ENERGY SAVING BALLAST.
	HARDWIRED CEILING-MOUNTED SMOKE ALARM & CARBON MONOXIDE DETECTORS W/ BATTERY BACK-UP
	CEILING MOUNTED EXHAUST FAN 80 CFM 100 WATTS
	J-BOX FOR WATER HEATER
	PREWIRED FOLLOWING APPROVED DRAWINGS
	GE 1/3 HORSEPOWER CONTINUOUS FEED DISPOSER DIM. 12-11/16"HX5-3/16" W, 1900 RPM's, 8 LBS., MODEL #GFC320F



- 3.0 Ton
- AC 1**
- Air Conditioner, GMC Brand, Roofmount, PCK036-1 10KW
36,000 Nom. Btu Cooling Capacity - 10.00 SEER
34,120 Btu Heating From 10 KW Strip
Dual Circuit: Circuit #1: MCA 25.3, MDCP 40, Min Wire Size #8
Circuit #2: MCA 50, MDCP 60, Min Wire Size #6
1325 CFM @ .3 Esp. High Speed, Max. Unit Weight 665 lbs.
230 Volts, 60 Cycle, Single Phase
Geary Pacific Curb Frame-In Dwg. # 01-0001. Reference Item # 1
(Select & Include Only One Of The Below With Each Roof Mount Unit)
- With Manual 10% Intake Only Outside Air Damper PCMD-1, Washable Metal Filter. HVAC Unit Filters Located on Roof In Plenum, Size: 16" x 20", 2" Pleated.
 - or With Classroom Ventilator BHKV1, 50% Intake and Exhaust, CRV Pleated Filter 14" X 20", 2" Located on Roof. HVAC Unit Filters Located on Roof in Plenum, Size: 16" x 20", 2" Pleated.
 - or With Economizer PCE-1 & LAC, 100% Intake and Exhaust, Economizer Pleated Filter 14 3/8" x 18 1/2", 1" Located On Roof. Auxiliary Means Of Exhaust Required. HVAC Unit Filters Located On The Roof in Plenum, Size: 16" x 20", 2" Pleated.
- T** THERMOSTAT (STANDARD)
- ⊗** SUPPLY REGISTER-CEILING, AIRMATE, 604M, MLD, 4 WAY FIXED CURVE BLADE, U.N.O.,
- ⊠** RETURN GRILLE-CEILING, AIRMATE, 170, STAMPED FACE, U.N.O.
- EF 1** 109 CFM Exhaust Fan, Broan # L100, 1.0 Sones, 1.1 Amps, 87 Watts, With 6" Duct To Broan # 634 Roof Cap



EXTERIOR ELEVATIONS
1/4" = 1'-0"

KEYNOTES	
1	EXTERIOR FINISH SEE SHT. C-1
2	EXTERIOR LIGHT SEE SHT. C-1
3	ELECTRICAL PANEL SEE SHT. C-1
4	ROOFING SEE SHT. C-1
5	EXTERIOR DOOR SEE DOOR SCHEDULE ON SHT. C-1
6	EXTERIOR WINDOW SEE WINDOW SCHEDULE ON SHT. C-1
7	WALL MOUNTED HVAC SEE SHT. C-1
8	8" TOP TRIM
9	4" SIDE TRIM
10	6" BOTTOM TRIM
11	DOWNSPOUTS
12	SECURITY BARS
13	FIRE ALARM HORN OR BELL LOCATED @ 8'-6" ON THE EXTERIOR. CONDUIT TO BE STUBBED INTO ATTIC SPACE ONLY.
14	VENT

REVISION	DATE/ BY

JVM DRAFTING
ARCHITECTURAL DRAFTING AND DESIGN
CAD DRAWINGS
JULIAN MORALES

MBC
1258 STOTLER COURT
POWAY, CA 92064 1326
(858) 679-1185 (858) 679-6804
PROJECT

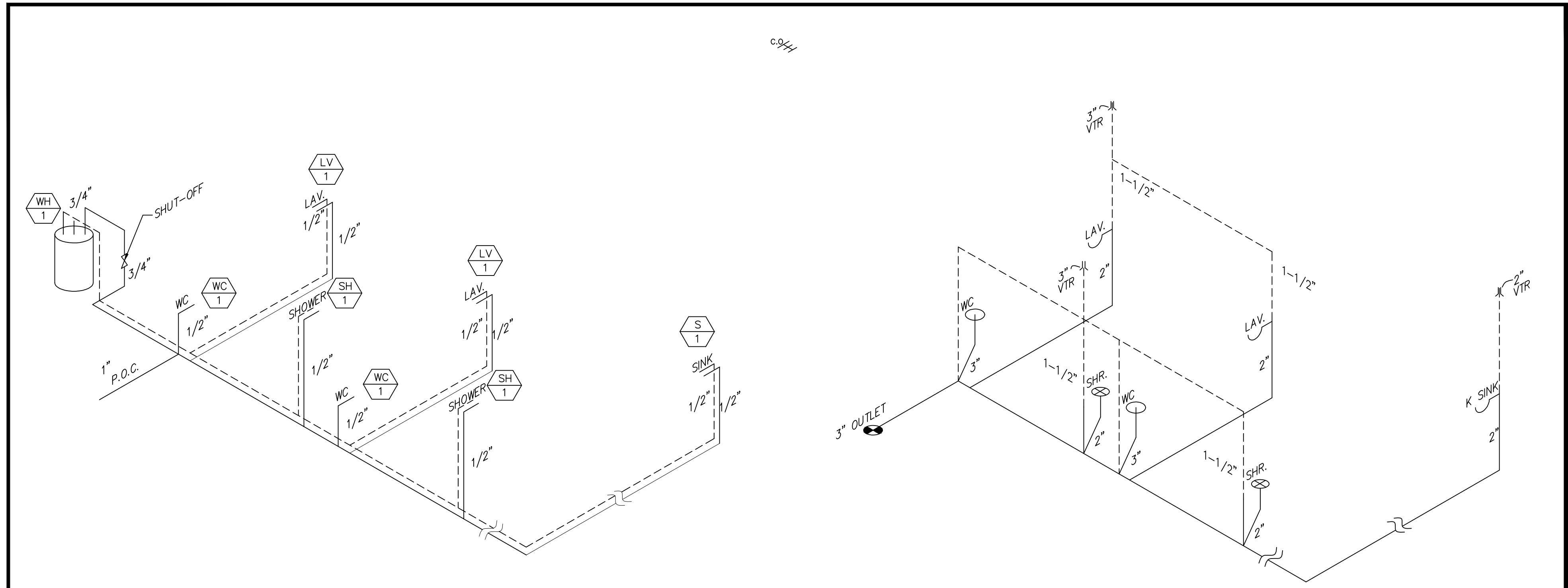
24' X 50' DOUBLE WIDE
FIRE-RESCUE DEPARTMENT
MODULAR BUILDING

REFLECTED CEILING,
MECHANICAL PLAN, &
EXT. ELEVATIONS

DRAWN: JVM
CHK'D:
DATE: 6-2-15
SCALE: 1/4"=1'-0"
JOB NO.: 215-15
SHEET
A-2

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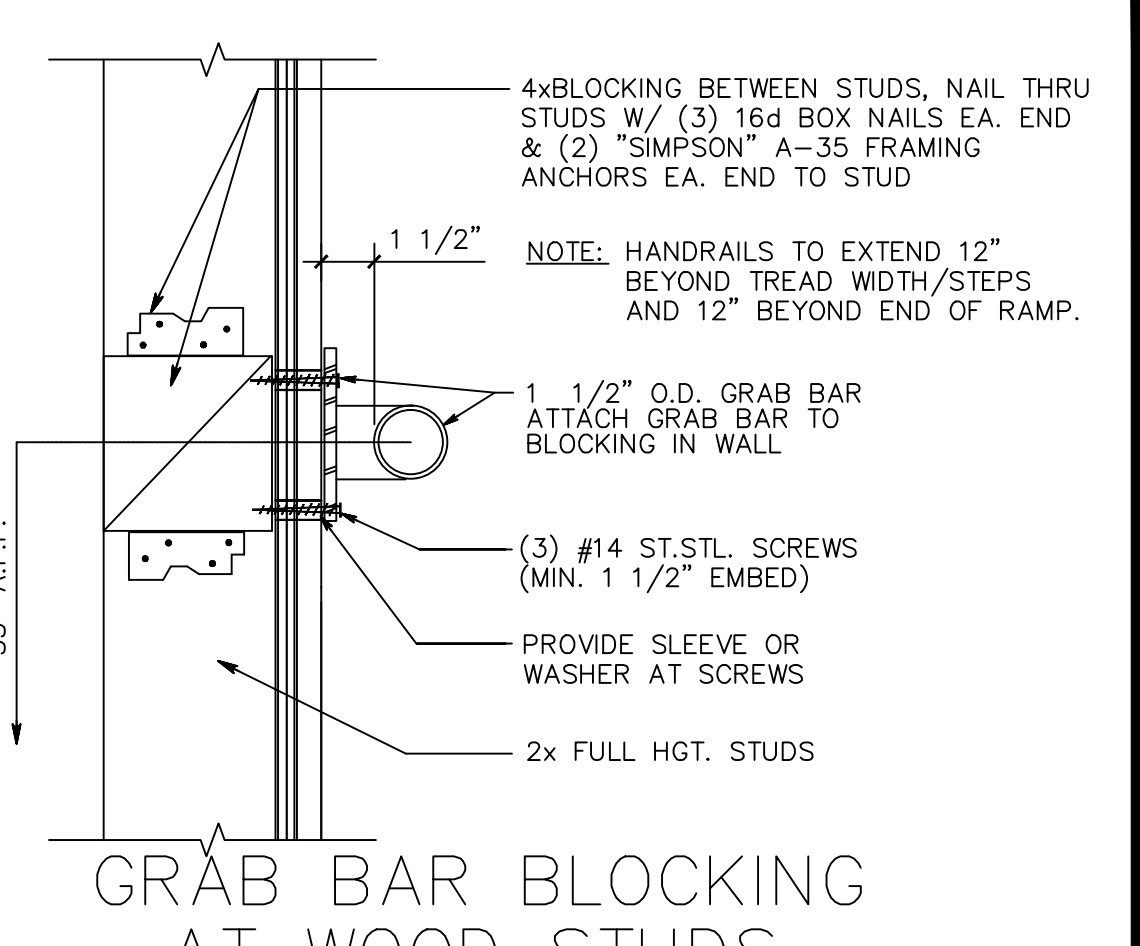
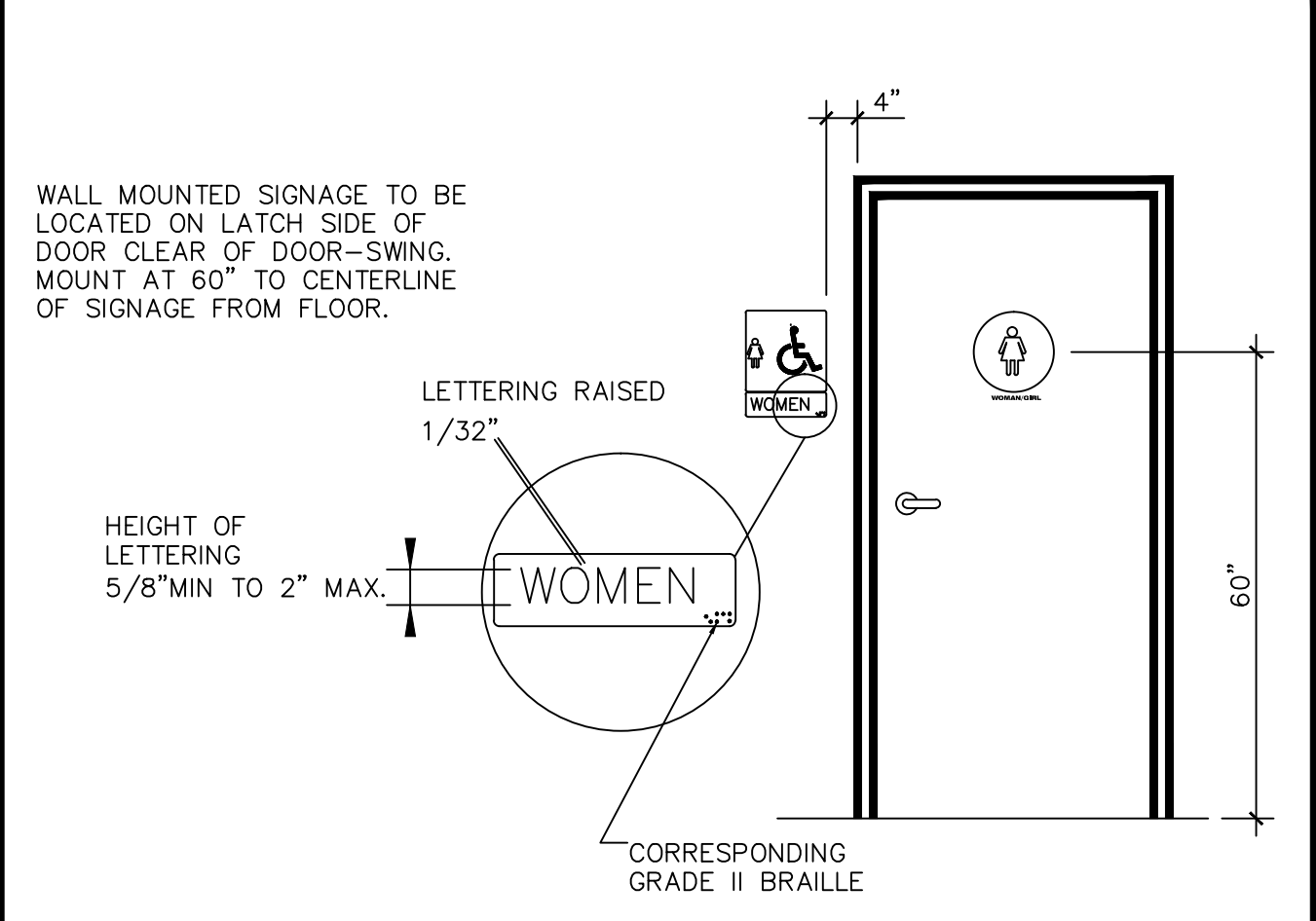
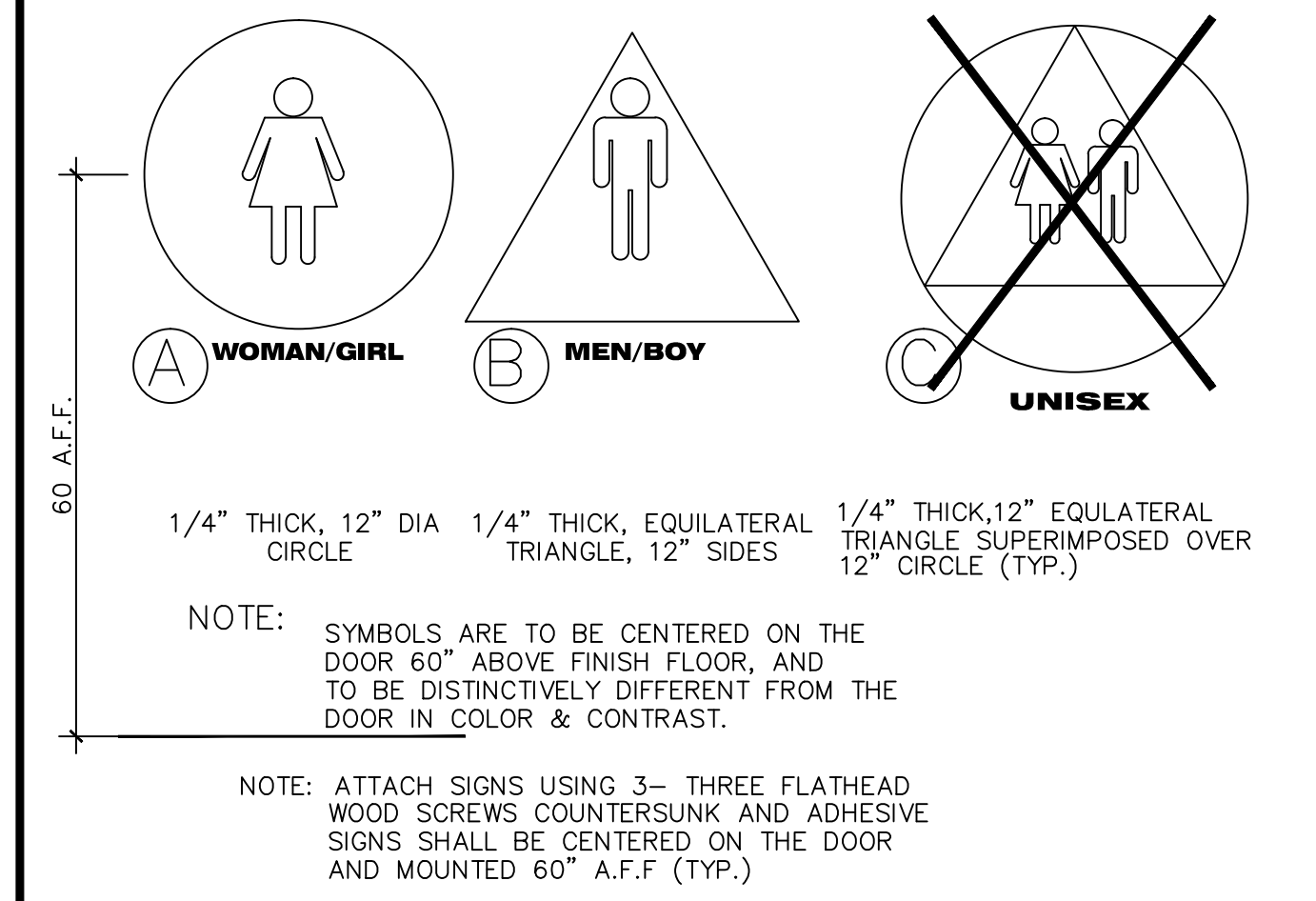
SUPPLY PLUMBING

DEVELOPED LENGTH: LESS THAN 40'
 ASSUMED WATER PRESSURE: 40-60 PSI
 FIXTURE UNITS CW: 34
 FIXTURE UNITS HW: 24

WASTE PLUMBING

FIXTURE UNITS: 11.5

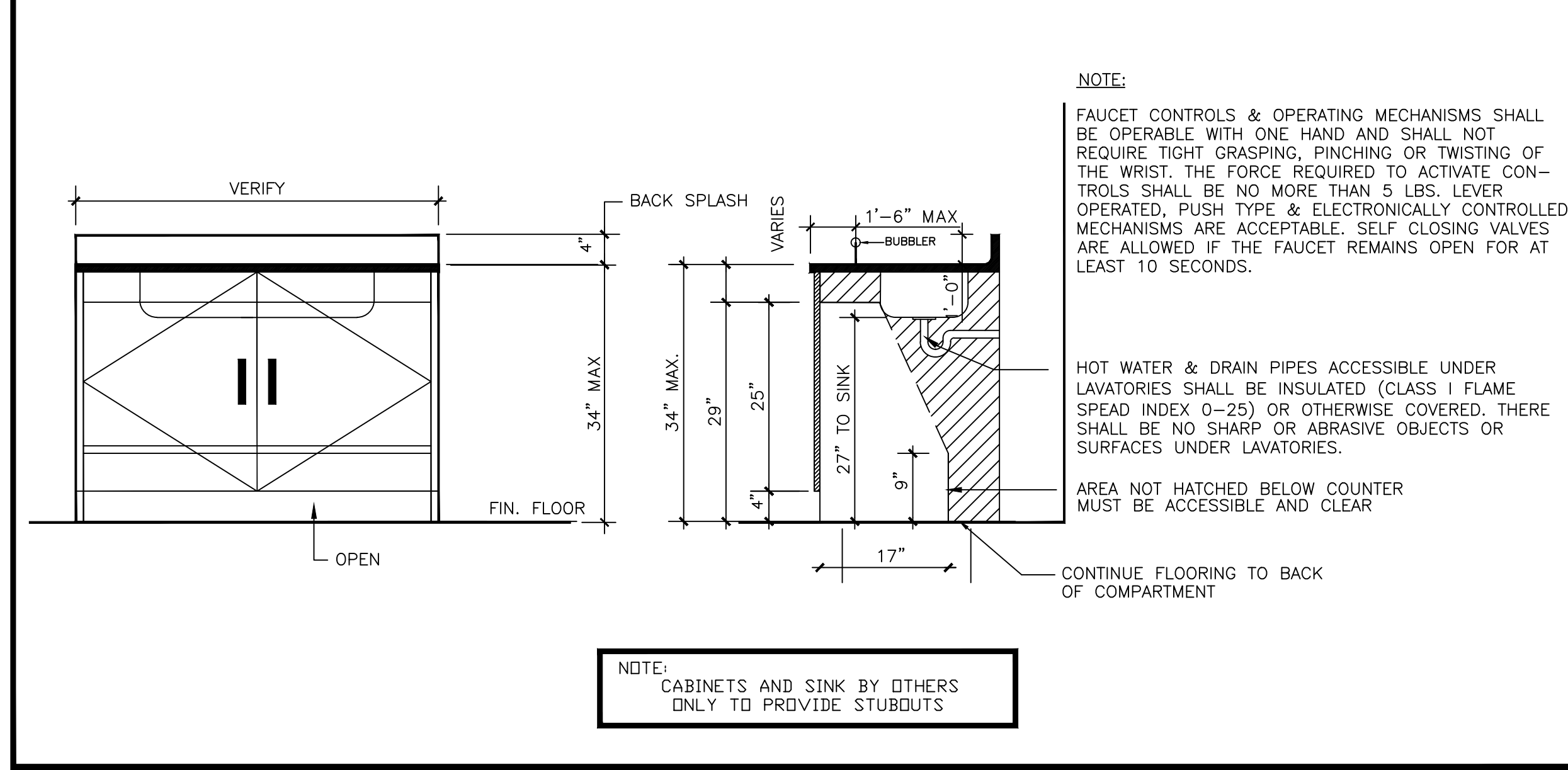
PLUMBING ISO.



ACCESSIBLE RESTROOM SIGNAGE 1

ROOM SIGNAGE 2

GRAB BAR BLOCKING 3



NOTE:

FAUCET CONTROLS & OPERATING MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO MORE THAN 5 LBS. LEVER OPERATED, PUSH TYPE & ELECTRONICALLY CONTROLLED MECHANISMS ARE ACCEPTABLE. SELF CLOSING VALVES ARE ALLOWED IF THE FAUCET REMAINS OPEN FOR AT LEAST 10 SECONDS.

HOT WATER & DRAIN PIPES ACCESSIBLE UNDER LAVATORIES SHALL BE INSULATED (CLASS 1 FLAME SPREAD INDEX 0-25) OR OTHERWISE COVERED. THERE SHALL BE NO SHARP OR ABRASIVE OBJECTS OR SURFACES UNDER LAVATORIES.

AREA NOT HATCHED BELOW COUNTER MUST BE ACCESSIBLE AND CLEAR

CONTINUE FLOORING TO BACK OF COMPARTMENT

A = ADULT DIMENSIONS (AGE 12 AND OVER)

DIMENSION	REQUIRED		SUGGESTED	
	A	E	K	
A TOILET CENTERLINE FROM WALL	18"			
B TOILET SEAT HEIGHT - DIM TO TOP OF SEAT	17"-19"			
C GRAB BAR HEIGHT (SIDE)	33"			
D TOILET PAPER IN FRONT OF TOILET	12" MAX.			
E				
F DISPENSER OR MIRROR HEIGHT	40" MAX.			
G LAVATORY/SINK TOP HEIGHT	34" MAX.			
H LAVATORY/SINK KNEE CLEARANCE	27" MIN.			
J URINAL LIP HEIGHT	17" MAX.			
K URINAL FLUSH HANDLE HEIGHT	44" MAX.			
L				
M				
O				

FIXTURE SCHEDULE

SYMBOL	DESCRIPTION	WASTE	VENT	C.W.	H.W.
WC 1	AMERICAN STANDARD CADET #9468.018 ELONGATED WATER SAVER TOILET. SLOAN 115YB FLUSH VALVE. BEMIS 1955-C OPEN FRONT SEAT. INSTALL FIXTURE IN COMPLIANCE WITH STATE REQUIREMENTS FOR THE PHYSICALLY HANDICAPPED	3"	3"	3/4"	
LV 1	20"x18" A WALL MOUNTED LAVATORY ANGLE STOPS WITH 1/2" SUPPLY AND WALL ESCUTCHEON. 5 GPM FLOW RESTRICTOR AND P-TRAP. INSTALL IN ACCORDANCE WITH STATE REQUIREMENTS FOR THE PHYSICALLY HANDICAPP	2"	1-1/2"	1/2"	1/2"
KS 1	DOUBLE SINK: KINGSFORD/DAYTON #K23322. 33"x22" S.S. DOUBLE BOWL SINK, W/MOEN VALVE MODEL #7300, IN-SINK-ERATOR GABAGE DISPOSAL P-TRAP. INSTALL IN ACCORDANCE WITH STATE REQUIREMENTS FOR THE PHYSICALLY HANDICAPP	2"	1-1/2"	1/2"	1/2"
SH 1	ACCESSIBLE SHOWER 36" WIDE x 60" DEEP PRE MOLDED GEL COATED FIBERGLASS REINFORCED POLYESTER RESIN CONSTRUCTION, W/GRAB BAR, SOAP DISH, & FOLD DOWN WHEELCHAIR TRANSFER SEAT & CURTAIN ROD.	2"	1-1/2"	1/2"	1/2"
WH 1	30 GALLON ELECTRIC WATER HEATER SMITH COMMERCIAL WATER HEATER DEN-DEL MODEL #DEL-30			3/4"	3/4"

NOTES:

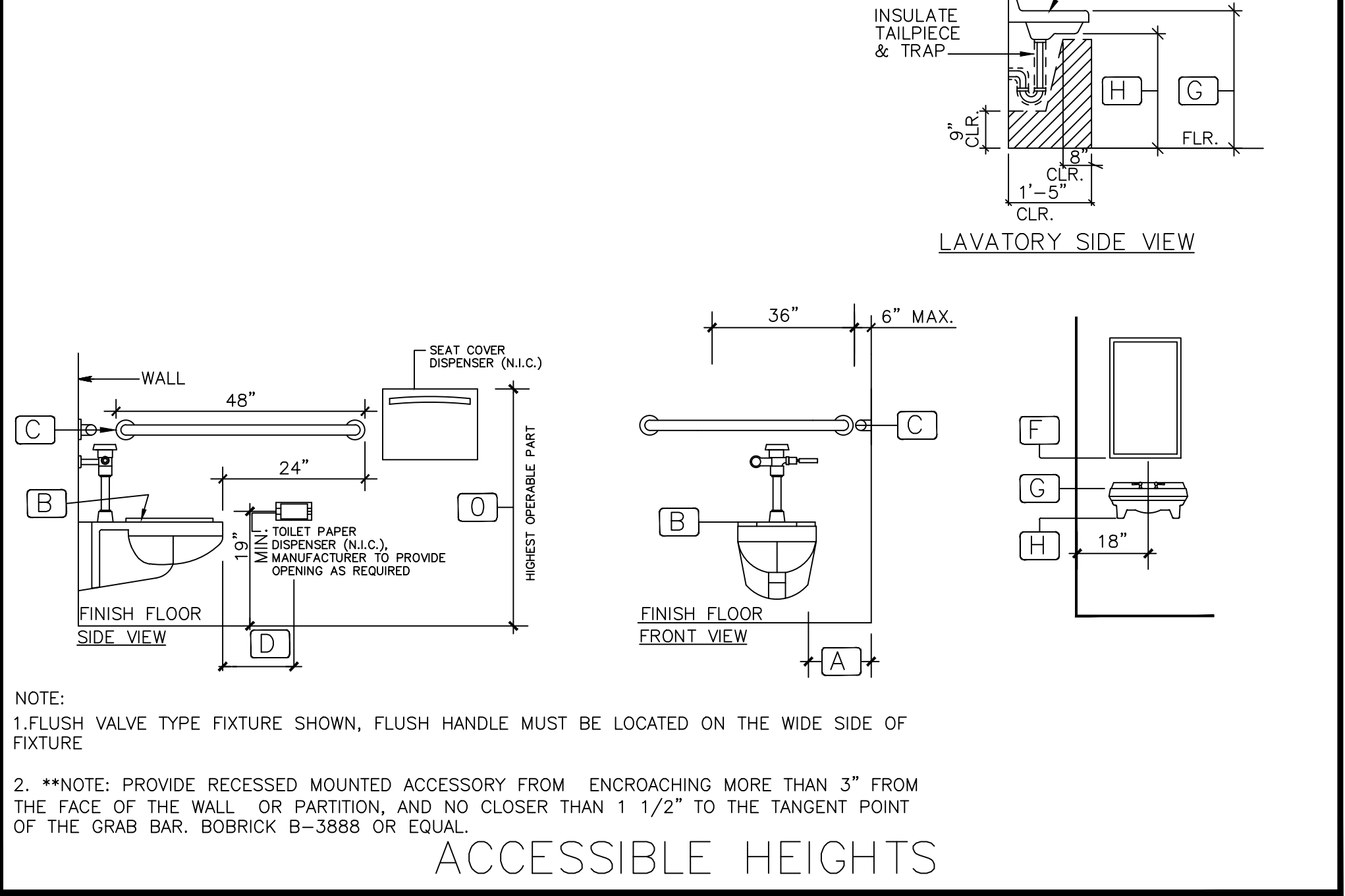
WASTE AND WATER STUBBED BELOW FLOOR
 WASTE PIPING ARE TO BE ABS

ACCESSORIES:

GRAB BARS: 36" & 42"
 MIRRORS: 18" x 36" UNFRAMED - POLISHED EDGES 40" A.F.F.
 HANDICAP R.R. SIGN
 PLUMBING DROP AND VENTS
 TOILET PAPER DISPENSER: SINGLE ROLL, SURFACE MOUNTED

LEGEND:

COLD WATER _____
 HOT WATER - - - - -



NOTE:

1. FLUSH VALVE TYPE FIXTURE SHOWN, FLUSH HANDLE MUST BE LOCATED ON THE WIDE SIDE OF FIXTURE

2. **NOTE: PROVIDE RECESSED MOUNTED ACCESSORY FROM ENCRDACHING MORE THAN 3" FROM THE FACE OF THE WALL OR PARTITION, AND NO CLOSER THAN 1 1/2" TO THE TANGENT POINT OF THE GRAB BAR. BOBRICK B-3688 OR EQUAL.

ACCESSIBLE HEIGHTS

CABINET AND SINK DETAIL 4

ACCESSIBILITY DIMENSIONS 5

ACCESSIBLE FIXTURE ELEVATIONS 6

REVISION	DATE/ BY

JVM DRAFTING
 ARCHITECTURAL DRAFTING AND DESIGN
 CAD DRAWINGS
 JULIAN MORALES

MBC
 1258 STOTLER COURT
 POWAY, CA. 920641326
 (858) 679-1185 (858) 679-6804

PROJECT
 24' X 50' DOUBLE WIDE
 FIRE-RESCUE DEPARTMENT
 MODULAR BUILDING

PLUMBING ISO, SCHEDULE, & SIGNAGE DETAILS

DRAWN: JVM
 CHK'D:
 DATE: 6-3-15
 SCALE: 1/4"=1'-0"
 JOB NO.: 215-15
 SHEET
A-3

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FOR REFERENCE ONLY

Mandatory Disclosure of Business Interests Form

BIDDER/PROPOSER INFORMATION

EC Constructors, Inc.

Legal Name	DBA		
9834 River Street	Lakeside	CA.	92040
Street Address	City	State	Zip
Sherri L. Summers, CEO	(619) 440-7181	(619) 440-7180	
Contact Person, Title	Phone	Fax	

Provide the name, identity, and precise nature of the interest* of all persons who are directly or indirectly involved** in this proposed transaction (SDMC § 21.0103).

* The precise nature of the interest includes:

- the percentage ownership interest in a party to the transaction,
- the percentage ownership interest in any firm, corporation, or partnership that will receive funds from the transaction,
- the value of any financial interest in the transaction,
- any contingent interest in the transaction and the value of such interest should the contingency be satisfied, and
- any philanthropic, scientific, artistic, or property interest in the transaction.

** Directly or indirectly involved means pursuing the transaction by:

- communicating or negotiating with City officers or employees,
- submitting or preparing applications, bids, proposals or other documents for purposes of contracting with the City, or
- directing or supervising the actions of persons engaged in the above activity.

James L. Summers	President
Name	Title/Position
San Diego County- California	
City and State of Residence	Employer (if different than Bidder/Proposer)
49% ownership	
Interest in the transaction	

Sherri L. Summers	CEO
Name	Title/Position
San Diego County- California	
City and State of Residence	Employer (if different than Bidder/Proposer)
51% ownership	
Interest in the transaction	

*** Use Additional Pages if Necessary ***

Under penalty of perjury under the laws of the State of California, I certify that I am responsible for the completeness and accuracy of the responses contained herein, and that all information provided is true, full and complete to the best of my knowledge and belief. I agree to provide written notice to the Mayor or Designee within five (5) business days if, at any time, I learn that any portion of this Mandatory Disclosure of Business Interests Form requires an updated response. Failure to timely provide the Mayor or Designee with written notice is grounds for Contract termination.

sherri l. Summers, CEO		5-17-18
Print Name, Title	Signature	Date

Failure to sign and submit this form with the bid/proposal shall make the bid/proposal non-responsive. In the case of an informal solicitation, the contract will not be awarded unless a signed and completed Mandatory Disclosure of Business Interests Form is submitted.

Bid Results

Bidder Details

Vendor Name EC Constructors Inc.
Address 9834 River Street
 Lakeside, CA 92040
 United States
Respondee Jim Summers
Respondee Title President
Phone 619-440-7181 Ext.
Email jim@ecconstructors.com
Vendor Type CAU,FEM,PQUAL,CADIR,WBE,WOSB,Local
License # 585677
CADIR 1000004249

Bid Detail

Bid Format Electronic
Submitted May 22, 2018 1:57:31 PM (Pacific)
Delivery Method
Bid Responsive
Bid Status Submitted
Confirmation # 140166
Ranking 0

Respondee Comment

Buyer Comment

Attachments

File Title	File Name	File Type
Contractors Cert of Pending Actions	B- Contractors Cert of Pending Actions- Signed.pdf	Contractor's Certification of Pending Actions
Mandatory Disclosure of Business Interest	C- Mandatory Disclosure of Business Interests Form-Signed.pdf	Mandatory Disclosure of Business Interests
Bid Bond	A- Bid Bond - Signed.pdf	Bid Bond

Line Items

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
Main Bid						
1	Bonds & Insurance (Payment and Performance)					
	524126	LS	1	\$34,501.00	\$34,501.00	
2	Tenant Improvement of Flight Service Station (FSS)					
	236220	LS	1	\$2,498,742.00	\$2,498,742.00	
3	Building Permits & Inspection for Permanent Facility: (EOC-Type I)					
	236220	AL	1	\$50,000.00	\$50,000.00	
4	Furniture, Fixtures and Equipment					
	236220	AL	1	\$150,000.00	\$150,000.00	

Bid Results

Type	Item Code	UOM	Qty	Unit Price	Line Total	Comment
5	Temporary Facilities					
	236220	LS	1	\$106,080.00	\$106,080.00	
6	Communications & Utilities					
	238210	LS	1	\$60,596.00	\$60,596.00	
7	WPCP Development					
	236220	LS	1	\$735.00	\$735.00	
8	WPCP Implementation					
	237990	LS	1	\$14,923.00	\$14,923.00	
9	Field Orders (EOC Type II)					
		AL	1	\$250,000.00	\$250,000.00	
10	Fire Service Connection and Assembly (6 Inch)					
	237110	EA	1	\$48,967.00	\$48,967.00	
Subtotal					\$3,214,544.00	
Total					\$3,214,544.00	

Subcontractors

Name & Address	Description	License Num	CADIR	Amount	Type
Finest City Acoustics, Inc 10045 Carroll Canyon Rd, Ste. B San Diego, CA 92131 United States	Acoustical Ceiling	882817	1000013400	\$18,910.00	
Spooner's Woodworks, Inc. 12460 Kirkham Court Poway, CA 92064 United States	Casework	672108	1000004870	\$118,010.00	
Magnesite Specialties, Inc. 8686 Production Ave., Ste. A San Diego, CA 92121 United States	Concrete Stain	397738	1000006683	\$18,900.00	CAU,MALE,CADIR
Red Hawk Fire & Security 920 S. Andreasen Drive Suite 102 Escondido, CA 92029 United States	Fire Alarm	713099	1000009781	\$18,860.00	
Nexon Corporation 5450 Complex Street San Diego, CA 92123 United States	Demolition and Abatement	897099	1000006049	\$100,945.00	
CMT Alpine Electric, Inc. 1666 N. Magnolia Avenue, Suite I El Cajon, CA 92020 United States	Electrical	747417	1000010130	\$292,021.00	
Mech One, Inc. PO Box 301864 Escondido, CA 92030 United States	HVAC	934023	1000001944	\$220,000.00	DVBE,FEM,SDVSB, SLBE,WBE,WOSB
E.L. Hobbs, Inc. 1900 Weld Blvd. Suite 215 El Cajon, CA 92020 United States	Gypsum Board and Plastering	777073	1000004428	\$278,500.00	CADIR,CAU,MALE,S LBE
Titan Fire Protection, Inc 2880 Scott St Vista, CA 92081 United States	Fire Sprinklers	989280	100016631	\$45,163.00	CAU,MALE,CADIR

Bid Results

Name & Address	Description	License Num	CADIR	Amount	Type
Commercial Openings, Inc. 9711 Cactus Street Lakeside, CA 92040 United States	Doors and Frames	B C61/D28	1000002898	\$87,870.00	CADIR
Alcal Specialty Contracting 1232 Simpson Way Suite B Escondido, CA 92029 United States	Insulation	815286	1000000315	\$26,290.00	
A&S Flooring 2461 Fenton Street Chula Vista, CA 91914 United States	Flooring	801134	1000003115	\$25,475.00	
The Glass Company 870 Canarios Court Chula Vista, CA 91911 United States	Glazing	851092	1000000702	\$41,500.00	
World Bridge Technologies, Inc. 9330 STEVENS ROAD Santee, CA 92071 United States	Low Voltage & Speakers	848495	1000003896	\$49,500.00	
A. Preman Roofing, Inc. 1133 West Morena blvd San Diego, CA 92110 United States	Roofing	764917	1000006355	\$79,305.00	PQUAL,CADIR
DRV Modular Contractors, Inc. 4313 Resmar Road La Mesa, CA 91941 United States	Modular Building Moving	680131	1000000387	\$26,700.00	CAU,FEM,CADIR
A. E. L. Construction, Inc. 505 State Place Escondido, CA 92029 United States	Tubular Skylights	681424	1000000321	\$26,380.00	CADIR
Dave Whipple Sheet Metal, inc. 1077 North Cuyamaca St El Cajon, CA 92020 United States	Sheet Metal	736812	1000002501	\$16,452.00	
Continental Marble & Tile Company 2460 Anselmo Drive Corona, CA 92879 United States	Tiling	394	1000002594	\$68,644.00	
Vasquez Construction Company 3009 G Street San Diego, CA 92102 United States	Painting	560999	1000002710	\$37,917.00	
HR Plumbing, Inc 4751 Oceanside Blvd Suite C Oceanside, CA 92056 United States	Plumbing & Site Utilities	970044	1000002886	\$196,546.00	CADIR,CAU,MALE,S LBE